

Recall in Older Cancer Patients: Measuring Memory for Medical Information

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Purpose: Remembering medical treatment information may be particularly taxing for older cancer patients, but to our knowledge this ability has never been assessed in this specific age group only. Our purpose in this study was to investigate older cancer patients' recall of information after patient education preceding chemotherapy. **Design and Methods:** We constructed a recall questionnaire consisting of multiple-choice questions, completion items, and open-ended questions related to information about treatment and recommendations on how to handle side effects. Immediately after a nursing consultation preceding chemotherapy treatment, 69 older patients ($M = 71.8$ years, $SD = 4.1$) completed the questionnaire. We checked recall against the actual communication in video recordings of the consultations. **Results:** On average, 82.2 items were discussed during the consultations. The mean percentage of information recalled correctly was 23.2% for open-ended questions, 68.0% for completion items, and 80.2% for multiple-choice questions. **Implications:** Older cancer patients are confronted with a lot of information. Recall of information strongly depended on question format; especially active reproduction appeared to be poor. To improve treatment outcomes, it is important that cancer patients are able to actively retrieve knowledge about how to prevent and recognize adverse side effects and that this is checked by

the health professional. We make suggestions on how to make information more memorable for older cancer patients.

Key Words: Cancer care, Cognition, Memory, Patient education

Older adults experience age-related cognitive changes that may impede their ability to process and remember information (Brown & Park, 2003; Kessels, 2003), as they often process information more slowly (Salthouse, 1996) and have reduced working memory capacity (Bopp & Verhaeghen, 2005; Grady & Craik, 2000). Memory for information in older adults can be hampered further in case of sensory deficits (Grady & Craik, 2000), fatigue, stress (Brown & Park, 2003), or depression (Paterniti, Verdier-Taillefer, Dufouil, & Alperovitch, 2002). Age-related losses are linked to the nature of the memory task. Decrements are usually slight in tasks relying on automatic processes, such as implicit memory tasks or recognition, but more substantial in tasks requiring effortful processing such as recall (Grady & Craik, 2000; Light, 1991). Unfortunately, when delivering information to older patients, health professionals rarely take notice of age-related cognitive changes and memory decline (Brown & Park, 2003).

Providing medical information to older patients by taking into account their cognitive functioning is likely to increase treatment compliance and informed decision making (Kessels, 2003). Overviews of research on medical information processing by Brown and Park (2002, 2003) suggest that, relative to younger patients, older patients have greater difficulty in recalling several types of medical information, including the contents of drug labels, treatment recommendations, appointments, and familiar or unfamiliar disease information. However, these studies mainly examined age effects by using written medical information. Recall may be especially difficult for older patients in more complex processing

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environments, such as during patient education consultations, with large amounts of information discussed and little time to evaluate the information. In case of cancer, recall may be more problematic because the stigma and fear associated with the diagnosis, the complexity of the medical information, and the uncertainty regarding the course of the disease and treatment add an emotional dimension (Siminoff, Ravdin, Colabianchi, & Sturm, 2000).

Several studies have assessed recall of information in cancer patients and suggested that older cancer patients have more problems recalling medical information compared with younger patients (Butow, Brindle, McConnell, Boakes, & Tattersall, 1998; Butow, Dunn, Tattersall, & Jones, 1995; Olver, Turrell, Olszewski, & Willson, 1995; Ong et al., 2000). However, the distinctive issues and concerns of the aging patient in relation to recall in particular have hardly been investigated. Therefore we need to focus more specifically on the recall process in this age group. As Sanderman, Coyne, and Ranchor (2006) rightfully pointed out, although the age of patients is always reported, age is much less discussed as a substantive concern. This is rather remarkable, because cancer disproportionately strikes individuals aged 65 years and older, and this group is growing (Yancik, 2005).

Better recall of information may enhance the chance that the older patient behaves adequately when treatment-related problems occur, and therefore this ability is worthwhile to assess. It has been suggested that, to measure recall comprehensively, the health professional should judge it against the information that was actually given (Michie, French, Allanson, Bobrow, & Marteau, 1997). Furthermore, the type of questions used should be determined by the goal of assessing recall (Martinez, 1999; Messick, 1995), which may either be directed at the reproduction or recognition of information. In addition, a recall questionnaire should be based on knowledge about information processing and memory in the older adult (Carlson, Feldman-Stewart, Tishelman, & Brundage, 2005). Literature suggests that performance on open-ended questions declines more with age than does performance on multiple-choice and completion items (Craik & McDowd, 1987). This suggests that older adults might not be able to actively recall all information but may still recognize it correctly (Brown & Park, 2003; Morrow et al., 2005).

In the present study we extend the knowledge about older patients' memory for medical information. First, we investigate older patients' memory for medical information in a real-life and complex setting, that is, education about chemotherapy treatment. Most studies on memory for medical information in older adults have taken place in a laboratory, without the numerous distracters and cues present in real-life situations. Second, chemotherapy is a relatively common treatment in older patients with cancer, and even "minor forgetting" can have serious health consequences for these patients. Nevertheless, to our

knowledge, no studies to date have examined the older cancer patient's memory for information about chemotherapy treatment, despite the fact that a disproportionate percentage of older adults have cancer. Third, question type is expected to influence quality of recall. We chose to use open-ended questions to measure recall for recommendations about side effects, because it is especially important that patients can actively reproduce recommendations to be able to recognize and diminish adverse side effects of treatment. We used multiple-choice and completion items to measure recall for medical-technical information (e.g., treatment name), because recognition memory is often sufficient for this type of information, as patients can easily look it up when necessary. Finally, we compare recall responses to the actual content of the consultations, providing a more ecological measurement of recall.

Methods

Participants

We recruited participants from consecutive new patients in 10 Dutch hospitals between February of 2005 and July of 2006. The Medical Ethical Committee of the University Medical Centre Utrecht, The Netherlands, granted permission for the study, supplemented by local feasibility statements from all participating hospitals.

To be eligible for the study, patients had to meet the following inclusion criteria: they had to (a) be aged 65 years or older, (b) be receiving chemotherapy for the first time or for the first time in 5 years, (c) not be participating in a Phase III clinical trial, (d) have sufficient command of the Dutch language, and (e) have no history of cognitive deficiencies according to the medical file. We recruited a sample of 114 patients. Of these, 83 patients (72.8%) gave informed consent for us to videotape the consultation, and 31 patients refused to participate: 16 felt it was too much, 6 did not want the consultation to be videotaped, 4 felt too sick or too tired, 4 refused without giving a reason, and 1 gave a reason that was unknown to us. Of the 83 participating patients, 71 (85.5%) completed the recall questionnaire, and 12 declined: 5 for practical reasons, 5 felt it was too much, 1 felt too sick, and 1 refused without giving a reason. We later excluded 2 patients, 1 because of cognitive problems and another because he was assisted in completing the questionnaire, leaving 69 patients. Patient education was provided by 1 of 39 nurses, with an average of 1.8 times per nurse (range, 1–5).

Patient Education About Chemotherapy

Most oncology nurses in The Netherlands use a general guideline to inform patients who are scheduled to receive chemotherapy: *The Treatment*

Guide to Chemotherapy (Moosdijk & Postma-Schuit, 2000). In our sample of 39 nurses, 2 nurses from one hospital did not use this guideline. Topics usually explained during a consultation of approximately 1 hour are routines involved in chemotherapy, possible side effects from the chemotherapy, and how to deal with these. In some hospitals, the nurses also take the patients' medical history.

Procedure

We sent eligible patients a letter prior to being educated about chemotherapy to inform them about the study, including the video recordings. One day before their visit, one of the researchers telephoned the patients to answer any existing questions they might have. Just before starting the consultation, we obtained written informed consent from both the patient and the nurse, after which a researcher started the video recording and left the room. The unmanned camera was positioned to show the nurse's full face; patients were seen from behind or the side. Immediately after the consultation, patients were asked to complete a questionnaire, including recall. A researcher was available to read the questions aloud to the patients, if necessary.

Measures

Observation of Information and Recommendations.—We analyzed the videotapes by using an elaborate observation checklist developed for this study. We generated the checklist by using the *Treatment Guide to Chemotherapy* (Moosdijk & Postma-Schuit, 2000), relevant literature, pilot video observations, and information from previous studies on patient education (Tromp, van Dulmen, & van Weert, 2004; van Weert, van Dulmen, Bar, & Venus, 2003). We defined an information item as a segment of speech expressing a single idea concerning treatment and disease-related issues (Dunn et al., 1993). The categories in the checklist covered two main domains: (a) *information* about treatment and related issues and (b) *recommendations* on coping with potential side effects. Information categories included general information, history taking, cancer-specific information, treatment details, information about hospital routines, and possible side effects. Recommendation categories included coping with side effects, side effects that should be reported immediately, hygiene, consequences for daily life, and psychosocial coping. Additional elements that were discussed, but not included in the standard checklist, could be added to each category of the checklist, resulting in a complete content analysis of the consultation.

Measurement of Recall

We measured recall by using The Netherlands Patient Information Recall Questionnaire, which is

a structured questionnaire comparable with that of Dunn and colleagues (1993). To ensure content relevance (Messick, 1995), the questionnaire aimed to include questions representative of the main topics discussed in the consultations and at the same time relevant for patients coping with chemotherapy treatment. We again generated questions by using pilot observations of videotaped consultations and items presented in the *Treatment Guide to Chemotherapy* (Moosdijk & Postma-Schuit, 2000). Content validity of the questionnaire was tested by experts and 10 patients aged 65 years and older who had just been educated about chemotherapy. On the basis of their input, we revised the items considered ambiguous or difficult to understand. We used a mixture of question formats, including multiple-choice questions, completion items, and open-ended questions. As a consequence, recall measures differed in complexity, ranging from recognition (multiple-choice questions) to active recall (open-ended questions; see, e.g., Martinez, 1999).

Because this study involved older patients, we took special care to make the instructions and questions brief and simple. In addition, we printed the questionnaire in a large and easy to read font: Universe 12 (Sensis, Grave, The Netherlands). Because the content of education varied and the patients should not become worried by the suggestion that they had missed important information, all questions provided these additional response options: "not discussed" and "discussed, but I can't remember the details." The questions covered the two main domains of the observation checklist: information about treatment and recommendations on coping with potential side effects.

Information About Treatment.—The first part of the questionnaire consisted of 13 questions on the details of chemotherapy treatment and side effects. Included were 7 completion items requiring a short response (e.g., "How many treatments will you receive?") and 6 multiple-choice questions with four to six response options (e.g., "Will all patients experience the same side effects of chemotherapy treatment?" with these response options: "not discussed," "discussed, but I can't remember the details," "side effects are the same for all patients that are treated with this specific chemotherapy treatment," and "side effects can be different for each patient").

Recommendations on Coping With Potential Side Effects.—The second part of the questionnaire consisted of 11 open-ended questions. In 8 questions, patients were asked to write down recommendations on dealing with side effects. Each question began with the stem "Please write down as many recommendations as possible that the nurse gave about . . .," followed by one of the following eight categories: eating and drinking, mouth, fatigue, hair,

skin, stools, hygiene, and reasons to alarm the doctor or a nurse. Patients were asked 3 additional questions starting with the stem “Did the nurse talk to you about . . .,” followed by one of the following: “the consequences of chemotherapy treatment for your daily life (e.g., taking care for yourself at home or hobbies),” “feelings and emotions that you might experience as a result of chemotherapy treatment (e.g., anxiety, depressive feelings, or hope),” and “how you and the people around you can cope with the disease.” They were instructed to write down any recommendations that were discussed. We analyzed the latter two questions together, resulting in the subcategory of psychosocial issues.

Coding Reliability

We trained two coders. We resolved discrepancies during training through discussion. The main coder observed all consultations. The other coder coded a random 20% (15 consultations) of the main coder’s consultations. Interrater reliability (mean Cohen’s kappa) for the content analysis of the videos averaged 0.79 (range, 0.50–1.0). Interrater reliability for coding recall averaged 0.78 (range, 0.38–1.0) for the multiple-choice questions and 0.77 (range, 0.48–1.0) for the completion items in the first part of the questionnaire and 0.96 (range, 0.87–1.0) for the open-ended questions in the second part. We could not calculate Cohen’s kappa for two of the recall questions because one or two observers had no variation in their score. To summarize, interrater reliability for both the video observations and the recall questionnaire can be considered satisfactory (Dunn, 1989).

Background Data

Sociodemographic Characteristics.—We measured background variables with questions about age, gender, education, marital status, children, living arrangements, and occupation.

Disease Status.—We gathered data on diagnosis, type and nature of chemotherapy treatment, and other medical information from the nurse or oncologist.

Statistical Analysis

To determine differences between participants and nonresponders, we used chi-square and *t* tests where appropriate. We used descriptive statistics to summarize the frequency with which items were discussed and to assess the level of recall. We conducted the following analyses: first, we analyzed the occurrence of information and recommendation items in the consultations, as measured by an analysis

of the content of the videotaped visits; second, using the content analysis as a reference, we determined the proportion of items recalled. We compared the recall for each patient, as measured in the questionnaire, with the actual information provided.

Information About Treatment.—We scored the patients’ answers to the multiple-choice questions in a straightforward manner: We marked the written responses to each of the questions as either correct or incorrect (i.e., 0 or 1 points). Each response to a completion item received 0 (no correct information provided), 1 (some correct information provided), or 2 (all correct information provided) points. There were two exceptions. For the completion item “Chemotherapy usually consists of several treatments. When is your first treatment?,” a score between 0 and 3 could be obtained (for the correct date, day of the week, and time). For the completion item “In your own words, please write down five (5) side effects that the nurse mentioned that you might experience as a result of the chemotherapy treatment,” patients received between 0 and 5 points, depending on the number of correct side effects mentioned. We did not include in the analysis those questions concerning items that were not discussed. Subsequently, we calculated a proportion correct score for each patient by dividing the score on each question by the maximum score that could be obtained for that question and multiplying by 100. We calculated a total recall score for each patient by averaging the scores on all questions.

Recommendations on Coping With Potential Side Effects.—A recall score could be determined for a category of recommendations if at least one item of that category was scored on the observation checklist. Recall scores could range from 0 (not recalled), to 1 (recalled partially), to 2 (recalled accurately) points. For each of the 11 categories of recommendations, we computed a total score for each participant by summing all the points earned within that category. We then converted this total into a percentage score (i.e., we divided it by the maximum number of points that could be obtained for that category and multiplied by 100). Finally, we established a total recall score, that is, the mean recall percentage per patient.

The number of missing values was limited, as the researcher was present in the room and checked if all questions were answered. If responses were still missing, we did not include the question itself in the analysis, but we did calculate the average score for the remaining questions. Three patients filled out only the second part of the recall questionnaire with open-ended questions. In addition, we excluded the completion item about side effects from analysis for four patients because they completed an older version of the questionnaire and we therefore could

not reliably code this item. We performed all data analyses by using SPSS version 12.0 (Statistical Package for the Social Sciences, Chicago, IL).

Results

Patient Characteristics

On average, patients were 71.8 years of age ($SD = 4.1$) and the majority (75.7%) were consulted within 6 months of their first diagnosis of cancer (Table 1). Most patients were male (69.6%), lived together with their partner (68.1), had digestive or gastrointestinal (43.5%) cancer, and had a lower educational background (46.4%). Participating patients did not differ in age, gender, or diagnosis from nonparticipating patients.

Information and Recommendations Provided by Nurses

The mean amount of information and recommendations presented in the 69 consultations was 82.2 items (range 33–127). On average, 45.3 of these items concerned general information about disease and treatment (Table 2) and 36.9 items were recommendations on dealing with side effects (Table 3).

Information About Treatment

In all consultations, the nurses provided standard introductory information, for example about the goal of the consultation and the *Treatment Guide to Chemotherapy* (Moosdijk & Postma-Schuit, 2000). Side effects were discussed most extensively, especially side effects concerning blood and bone marrow. This was followed by treatment details, such as the treatment plan, how the treatment works, and logistical information. Routines in the hospital during treatment were discussed concisely (Table 2).

Recommendations on Coping With Potential Side Effects

The nurses discussed reasons to alarm the doctor or a nurse most extensively. Recommendations on side effects were also discussed, in particular those related to the digestive system. The nurses talked relatively less often about dealing with sexuality and how to handle effects of chemotherapy on the eyes and ears. The influence of chemotherapy on daily life, such as housekeeping and hobbies, and psychosocial issues, such as experienced emotions and coping with the disease, were discussed least elaborately (Table 3).

Recall of Information

Information About Treatment.—The first part of the questionnaire consisted of six multiple-choice

Table 1. Demographic and Disease Characteristics of the Sample (N = 69)

Characteristic	No.	%
Gender		
Male	48	69.6
Female	21	30.4
Age		
M (<i>SD</i>)	71.8 (4.1)	
Range	65.3–85.0	
Educational level		
Low	32	46.4
Middle	15	21.7
High	22	31.9
Living arrangements		
Alone	12	17.4
With partner	47	68.1
With partner and child(ren)	5	7.2
With child(ren)	2	2.9
Other	2	2.9
Unknown	1	1.4
Primary tumor site		
Digestive–gastrointestinal	30	43.5
Lung	16	23.2
Genitourinary	9	13.0
Breast	6	8.7
Hematologic	4	5.8
Gynecologic	3	4.3
Unknown	1	1.4
Time since diagnosis		
0–1 months	15	21.7
1–2 months	17	24.6
2–6 months	21	30.4
6–12 months	1	1.4
1–5 years	6	8.7
>5 years	6	8.7
Unknown	3	4.3

questions and seven completion items, and we analyzed these types of questions separately (Table 4). When measured with multiple-choice questions, 76.5% of the information about side effects was recalled and 82.8% of the details about chemotherapy was recalled (e.g., name of the treatment, duration of treatment, and how the treatment works). Using the completion items, these figures were 71.0% and 67.8%, respectively. Overall, recall scores were higher for the multiple-choice questions (80.2%) than for the completion items (68.0%). With multiple-choice questions, there is always a chance of guessing correctly. This chance depends on the number of response options. In this study, options varied between two and five. Using the Wilcoxon signed-rank test, we compared average scores on all six multiple-choice questions against the chance of guessing correct. On average, the number of correct scores appeared to be significantly greater than chance (from $T = 300$, $p < .001$, to $T = 21$, $p < .001$).

Table 2. Information Items Provided as Ordered by the Number of Items

Category	Consultations (%)	No. of Items [M, (SD)]	Range
Information total	100.0	45.3 (9.4)	24–64
Introduction			
History taking	95.7	5.7 (3.7)	0–17
General information	98.6	3.1 (1.2)	0–5
Cancer specific information	79.7	1.6 (1.2)	0–4
Treatment			
Side effects	100.0	21.7 (5.8)	8–33
Blood and bone marrow	98.6	6.4 (2.9)	0–12
Digestive system	100.0	5.1 (1.5)	2–9
Skin and hair	98.6	4.6 (2.0)	0–9
Mouth	94.2	1.7 (1.1)	0–6
General wellbeing and fatigue	89.9	1.5 (.9)	0–4
General information	85.5	1.3 (.8)	0–3
Eyes and ears	29.0	0.7 (.8)	0–3
Sexuality	43.5	0.6 (.7)	0–3
Details of therapy	100.0	10.1 (2.5)	5–16
Hospital routines	92.8	3.1 (2.1)	0–8

Note: Consultations (%) refers to the percentage of consultations in which elements were discussed. No. of items refers to the mean number of items discussed per consultation, averaged over all consultations ($n = 69$).

Recommendations on Coping With Potential Side Effects.—On average, patients accurately recalled 7.5 out of 34.7 recommendations (23.2%; see Table 5). Eighty percent of the recalled recommendations were recalled completely accurately, and the remainder were recalled only partially. In consequent analyses, we summed and averaged the completely and partially recalled items.

Recommendations on side effects relating to hair and skin were recalled best, with an average score of 36.1%. Reasons to alarm the doctor or a nurse reached the lowest recall score, 20.4%.

Of the recommendations on psychosocial issues, 27.4% were accurately recalled, as were 26.5% of the recommendations on dealing with the consequences of chemotherapy for daily life. However, these items were only discussed in a limited number of consultations.

Discussion

In this study we document the information recalled by older cancer patients after a chemotherapy education session with a nurse. We used different types of questions (multiple-choice, completion, and open-ended items) and compared patients' answers with the actual communication during the encounters, as measured by an observation checklist.

Nurses discussed an average of 82.2 items in this study, of which 45.3 items related to information

Table 3. Recommendations Made as Ordered by the Number of Items

Category	Consultations (%)	No. of Items [M, (SD)]	Range
Recommendations total	100.0	36.9 (13.5)	7–69
Recommendations: side effects			
Digestive system	95.7	8.0 (3.9)	0–18
Eating, drinking and nausea	95.7	6.8 (3.4)	0–15
Stools	66.7	1.3 (1.3)	0–5
Hygiene	92.8	6.2 (3.2)	0–13
Mouth	95.7	4.7 (2.6)	0–14
Skin and hair	94.2	3.9 (2.5)	0–10
General well-being and fatigue	82.6	2.7 (1.8)	0–6
Blood and bone marrow	58.0	1.0 (1.1)	0–4
Sexuality	52.2	0.7 (0.9)	0–3
Eyes and ears	29.0	0.4 (0.7)	0–2
Recommendations: miscellaneous			
Side effects to report	100.0	8.1 (3.5)	1–14
Psychosocial issues	42.0	0.8 (1.2)	0–5
Daily life	24.6	0.3 (0.5)	0–2

Note: Consultations (%) refers to the percentage of consultations in which elements were discussed. No. of items refers to the mean number of items discussed per consultation, averaged over all consultations ($n = 69$).

about details of chemotherapy treatment, hospital routines, and possible side effects. In addition, the nurses gave on average 36.9 recommendations on coping with side effects and related issues. We based the definition of information or recommendation items in this study on the research of Dunn and colleagues (1993). They found that, on average, 25.4 items were discussed in oncology consultations with an average duration of 28 minutes, one third taken up by physical examination. This translates to approximately 27 items in 20 minutes and corresponds to the 82.2 items discussed in 60 minutes in the current study, which provides a validation of our observation checklist.

In general, the older patients in this study had difficulty remembering items. The patients recalled only 23.2% of the recommendations given on handling side effects as measured with open-ended questions. The percentage of accurately recalled information about treatment was 80.2% for the multiple-choice questions and 68.0% for the completion items. We did not counterbalance the different question formats over the two categories, making it difficult for us to pinpoint why the multiple-choice questions and completion items were better remembered (as recall could be influenced by both the format and content of the questions). For example, some studies showed significantly lower recall of recommendations compared with other medical information (Ley, 1979). Also, our findings are in line with previous findings regarding question type and quality of recall. That is, several studies in cancer patients used one question format to measure recall across different

Table 4. Patients' Recall of Information Items

Category and Question Type	No. of Questions	No. of Patients	Max. Score (M)	Recall Score (M)	Recall Score (%)
Information total					
Multiple-choice	6	66	8.9 (1.7)	7.1 (2.2)	80.2 (19.4)
Completion item	7	65	13.6 (2.9)	9.2 (3.4)	68.0 (19.3)
Side effects					
Multiple-choice	2	66	3.8 (0.7)	2.9 (1.3)	76.5 (31.9)
Completion item	1	61	4.5 (.8)	3.2 (1.5)	71.0 (30.3)
Details of therapy					
Multiple-choice	4	66	5.1 (1.4)	4.2 (1.6)	82.8 (21.3)
Completion item	6	66	9.3 (2.4)	6.2 (2.5)	67.8 (20.8)

Note: No. of Patients refers to the number of patients for whom a recall percentage could be calculated; Max. Score refers to the average maximum score to be obtained, averaged over all consultations in which at least one item from the category was discussed and for which patient recall could be calculated; Recall Score (M) refers to the mean number of items recalled per consultation, averaged over all consultations in which at least one item from the category was discussed and for which patient recall could be calculated; Recall Score (%) refers to the mean percentage calculated over all consultations in which at least one item from the category was discussed and for which patient recall could be calculated. Standard deviations are shown in parentheses.

content areas, related to both medical-technical information and recommendations, and found similar results. High recall percentages ranging from 68% (Dunn, Steginga, Rose, Scott, & Allison, 2004) to 80% (Bakker et al., 1999; Bruera, Pituskin, Calder, Neumann, & Hanson, 1999) were reported in studies using multiple-choice questions, whereas more than five times lower recall percentages were obtained with open-ended questions (Dunn et al., 1993). This suggests that the method of measurement accounts for at least part of the differences in recall scores that we found in our study.

In support of this suggestion, the different types of questions are known to require different levels of cognitive processing. Both multiple-choice questions and completion items do not require elaborate

cognitive processing but rather tap from recognition memory (Martinez, 1999; Messick, 1995). In contrast, open-ended questions have a range of possible answers, requiring more complex information processing and active retrieval (Martinez; Messick). Cognitive aging theories suggest that the decrease in cognition that takes place with aging primarily occurs in effortful but not automatic processing (Brown & Park, 2003). Therefore, differences in recall scores for multiple-choice items and other formats might be even larger for older patients than for younger ones.

Some limitations of the current study should be noted. Because we did not assess the participants' preconsultation knowledge, we cannot draw conclusions about the extent to which prior education contributed to subsequent knowledge. We tried to

Table 5. Patients' Recall of Recommendations

Category	No. of Patients	No. of Items [M, (SD)]	No. of Recalled Items [M, (SD)]	Recall [%, (SD)]
Recommendations total	69	34.7 (12.6)	7.5 (3.7)	23.2 (12.3)
Recommendations: side effects				
Skin and hair	65	4.2 (2.4)	1.2 (.9)	36.1 (30.2)
Mouth	66	5.0 (2.5)	1.2 (1.0)	27.2 (24.6)
Digestive system	66	7.2 (3.5)	1.6 (1.3)	21.5 (16.7)
Stools	46	1.9 (1.1)	0.5 (.5)	31.4 (39.1)
Eating and drinking ^a	63	6.1 (2.8)	1.3 (1.2)	20.5 (19.6)
Hygiene	64	6.6 (2.9)	1.7 (1.0)	27.5 (21.0)
General well-being and fatigue	57	3.3 (1.5)	0.8 (.7)	26.6 (31.1)
Recommendations: miscellaneous				
Psychosocial issues	29	1.9 (1.1)	0.5 (0.6)	27.4 (40.9)
Daily life	17	1.1 (0.3)	0.3 (0.5)	26.5 (43.7)
Side effects to report	69	8.1 (3.5)	1.3 (1.0)	20.4 (20.4)

Notes: No. of Patients refers to the number of consultations in which at least one item from the category was discussed; No. of Items refers to mean number of items discussed per consultation, averaged over consultations in which at least one item from the category was discussed; No. of Recalled Items refers to the mean number of items recalled averaged over consultations in which at least one item from the category was discussed; Recall (%) refers to the percentage calculated over all consultations in which at least one item from the category was discussed. *SD* = standard deviation.

^aItems related to nausea are excluded as nausea was not measured in the recall questionnaire.

reduce this bias by looking at the first nursing encounter with patients that had not been treated previously with chemotherapy or at least not in the preceding 5 years, the latter rarely being the case. In addition, we obtained the data after a single presentation of the chemotherapy treatment information, and it is possible that recall might have been higher after prolonged and repeated contact with the nurse. However, some studies have shown a decrease in the recall of information over time (McGuire, 1996; Ong et al., 2000). In the current study we measured recall at one time point, that is, immediately following the consultation, to prevent contamination of information gained after consultations. The patients need to remember the information longer, because in most cases treatment starts days after the nursing education session. It would therefore be interesting to investigate how much information is retained over time. Furthermore, in this study, 39 different nurses, with on average fewer than two consultations per nurse, delivered the education. Inconsistencies and variability may exist in the quality of delivery of the medical education across nurses because of the communication style of each nurse, and it might be argued that encounters of the same nurse are more similar than those of different nurses (Hox, 1995). However, the number of consultations per nurse was too small for us to investigate multilevel effects on information provision and recall.

Apart from the format and content of the questions, other factors might be related to older cancer patients' recall of information. We used a post hoc analysis to investigate two of these factors. First of all, we investigated if accurate recall was related to the amount of time spent on a topic by coding duration of topics for a subset of 30 consultations and comparing this with recall performance by the use of Pearson's correlation coefficient. We found no relation between the average time used to discuss information and recommendations and recall for these two categories ($r = -.052$, $p = .80$ and $r = .139$, $p = .48$, respectively). Second, we investigated the effect of perceived importance on recall of information. Do nurses emphasize certain content as important because they find it relevant for the patient? We tested this possibility by looking at how often nurses repeated the information in a subset of 20 consultations. In one third of these consultations, no information was repeated. In the remaining consultations, an average of 3.5 (range 1–8) items was repeated, which is 4.3% of the average of 82.2 items discussed. This is in line with our observation that nurses provided patients with a large amount of information and do not seem to prioritize or signal important information by spending more time on the most important items or by repeating those items.

At the same time, recall may be enhanced for information that is of particular relevance to the patient. Personally relevant information is processed

more deeply (e.g., receives increased attention), leading to better comprehension, memory storage, and use of the information (Craik & Lockhart 1972; Ingram 1984). When measuring recall, researchers should therefore take into account the importance assigned to the information by both patients and nurses. A study is currently underway to investigate this issue. Finally, addressing patients' psychosocial and emotional needs is an important component of effective communication in health care settings (Liang et al., 2002). The quality of the nurses' socioemotional communication strategies could impact patient receptivity to information, which in turn may influence recall and should be investigated further.

Although the claims that can be made on the basis of the current results are somewhat limited, it is possible to provide additional suggestions to make information more memorable for older cancer patients. First, it is critical to distinguish information that patients have to be able to *reproduce* with little help from information that patients can look up. It is known that health professionals often overestimate how effective they are in imparting accurate information to patients and this might therefore require further improvement (Ford, Fallowfield, & Lewis, 1994), for example, by checking older patients' active recall for important information. As we mentioned previously, patients in this study were confronted with a large amount of information. It is difficult to imagine that anyone can retain that much information accurately, especially as the patients in this study were experiencing a stressful time and cancer patients often report that stress limits their ability to remember what they have been told during consultations (Friis, Elverdam, & Schmidt, 2003; Harden et al., 2002). To improve understanding and recall, health care professionals should try to categorize information, be explicit, prioritize, summarize the most important points and leave less important information for other occasions.

Another key factor is language level; statements in simple language will be recalled better than will complex formulations (Kessels, 2003). Health care professionals should therefore avoid using jargon that is common to them but not to older patients. Furthermore, in this study we assessed recall immediately after the consultation. However, providing information does not mean that it remains accessible over time (McGuire, 1996; Ong et al., 2000). It might therefore be helpful to repeat important information (Morrow, Leirer, Carver, Tanke, & McNally, 1999) and review it with patients on subsequent visits. In addition, the fact that the patients in this study scored significantly greater than chance on the multiple-choice questions suggests that older cancer patients do recognize the information when they see it. So, remembering can be aided further by providing written materials (see Kessels, 2003) for later referral, as was done in the current study, and helping patients to access important information throughout their

course of treatment. Finally, older patients could be encouraged to bring family members or friends with them to the consultation; literature suggests that a supportive accompanying individual may enhance communication (Liang et al. 2002), helping patients remember information and deal with treatment-related problems and side effects at home.

In conclusion, recall of medical information in older patients has so far been investigated mostly for written material and in laboratory settings. We conducted this study in a more complex and naturalistic processing environment, that is, education about chemotherapy treatment, and it revealed that older cancer patients are confronted with a lot of detailed information and recommendations. We observed a lack of retention for information about treatment that was passively recognized, but this was especially marked for recommendations that had to be actively generated. To facilitate meaningful comparisons among studies, it therefore seems important to consider and report precisely the measurement type used. Furthermore, to improve medical education for older patients, additional ecologically valid studies are needed that examine recall and more specifically variables that affect recall in complex, real-life settings.

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