PRACTICE GUIDELINES

FOR THE MANAGEMENT OF CONSTIPATION IN ADULTS

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INTRODUCTION

Constipation is the most common gastrointestinal complaint of persons in primary, acute, or long-term care settings in the United States. However, defining constipation and documenting its incidence and prevalence is difficult because people define regularity of bowel patterns differently.

Recognizing this, the Board of Trustees of the Rehabilitation Nursing Foundation (RNF) appointed a panel of experts—the Bowel Guidelines: Constipation Panel—to develop practice guidelines for the management of constipation in adults. Panel members included experts in rehabilitation nursing, nutrition, rehabilitation medicine, and consumer issues.

Evidence-based practice guidelines outline treatment recommendations that reflect the best available scientific knowledge for use in making medical decisions. Development of such guidelines requires a systematic, integrated review of the literature about the subject, a strategy for implementing the guidelines in professional practice, and an evaluative component (Ledbetter, 2000). The use of scientifically based guidelines to manage clinical situations improves efficiency in the delivery and quality of health care and helps to control health care costs. Guidelines also provide a tool with which to evaluate provider performance (Friedland, 1998; Ledbetter, 2000; Marek, 1994).

The guidelines panel appointed by the RNF first drafted a working definition of constipation and outlined a 6-step process for developing the guidelines and the adoption of the panel's recommendations. The RNF Board approved the process and hired a methodologist from the University of Cincinnati School of Nursing to search automated CINAHL and Medline databases for all applicable medical- and health-related articles published from 1968 through 1998. The following key words were used in the search: constipation research, adult constipation, constipation assessment, constipation prevention, constipation management, constipation intervention, constipation rehabilitation, constipation clinical trials, and laxative clinical trials. The search parameters included research and opinion articles; no limit was set as to the number of articles to be retrieved.

The methodologist also developed the code book format for displaying in table form the evidence from the literature upon which the practice guidelines were to be developed. Each table included a definition of constipation, the theory or framework developed for the study, the characteristics of the sample population—including inclusion and exclusion criteria, the type of study, methods and instruments used in the collection of data, treatment approaches, study results, and factors affecting internal and external validity. The strength of the scientific evidence in each article was evaluated according to whether the studies were: experimental, with or without controls groups; quasi-experimental; nonexperimental (qualitative or case study); or descriptive.

The methodologist assigned each study an evidence rating, selected from among the following:

1. Significant difference: no major design issues.
2. Significant difference: multiple design issues.

3. No significant difference.
4. Supportive evidence (no design issues).
5. Supportive evidence (design issues).
6. No supportive evidence.
7. Expert opinion: supportive
8. Expert opinion: nonsupportive

Each article was classified into one of the following categories: assessment, prevention, intervention, rehabilitation, or management. Of the 120 evidence tables, 44 were about assessment, 19 were about management of constipation, 43 were about interventions, 9 dealt with prevention of constipation, 1 was about rehabilitation, and 4 were classified as "other."

After the evidence tables were completed, panel members wrote drafts for their respective sections. Every panel member reviewed each draft, after which conceptual areas for the development of assessment and treatment recommendations were identified. Once recommendations were drafted, they were reviewed, in some instances revised, and then approved unanimously by the panel. External expert reviewers were then invited to comment on the proposed guidelines; many of their suggestions were incorporated into the final draft that was approved by the panel.

The guidelines that follow are intended for use by healthcare providers in their assessment and treatment of constipation in adults. Assessment guidelines include a guide to history taking and parameters for physical examination. Treatment guidelines include modifications in lifestyle, education of patients about toileting habits, dietary and fluid requirements, and pharmacological treatments.

The strength of evidence underlying many of the guideline recommendations is based primarily on expert opinion and consensus, with only a few interventions being based on controlled studies. This is not unusual since scientific evidence, based on well-controlled studies is, for many medical therapies, limited. Also, a systematic review of existing research to evaluate findings in relation to their practical use has not been conducted to date for many medical interventions (Havighurst, Hutt, McNeil, & Miller, 2000).

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DEFINITION & SCOPE OF THE PROBLEM

Constipation—which has been subject to multiple definitions and interpretations of risk factors—has throughout history been a health problem, increasing with the growth of civilization and industrialization (Whorton, 2000). Today, healthcare providers and researchers commonly define constipation in terms of the frequency of bowel movements (Tramonte et al., 1997). The definition most frequently heard is that people are constipated if they have bowel movements 2 or fewer times per week. Research with United States and British populations has shown that up to 99% of persons studied report frequency of bowel movements that range from 3 a day to 3 a week (Connell, Hilton, Irvine, Lennard-Jones, & Misiewicz, 1965; Whitehead, Drinkwater, Cheskin, Heller, & Schuster, 1989; Harari, Gurwitz, Avorn, Bohn, & Minaker, 1996; Ross, 1990; Towers et al., 1994). One proposed clinical definition of constipation is: A large amount of feces in the rectal ampulla and/or increased fecal content in the colon or rectum (Harari, Gurwitz, & Minaker, 1993).

The general public defines constipation through subjective symptoms such as straining to defecate (Koch & Hudson, 2000; Whitehead et al., 1989, Wong, Wee, Pin, Gan, & Ye, 1999), cramping, abdominal fullness or bloating, inability to pass stool, or a change in the usual bowel routine (Ross, 1993). Also, the public associates constipation with passing a hard stool, having a feeling that an evacuation was not complete, and passing an insufficient amount of stool (Fallon & O'Neill, 1997). The most frequently cited associated symptoms reported by Whitehead et al., (1989) and Moriarity and Irving (1992) were straining to defecate and abdominal pain.

A proposed definition of constipation derived from the literature is the passage of small amounts of hard, dry stool fewer than 3 times per week or a significant change in one's usual routine, accompanied by straining, and feelings of being bloated, or having abdominal fullness. Persistence of these symptoms for 3 months or longer is defined as chronic constipation.

Constipation, the most common gastrointestinal complaint, is estimated to affect 4.5 million people in the United States. It results in 2 million visits to healthcare providers annually. Older Americans self-medicate for constipation more than for any other physical condition; Americans spend $725 million for laxatives annually (NIDDK, 1995). Laxative use increases with age, with 6% of the population more than 40 years old taking one dose of laxative a month and 25% of the population over the age of 70 dosing at least once a month (Harari et al., 1996; Whitehead, et al., 1989). An estimated 64% of older frail adults frequently use laxatives (Wolfsen, Barker, & Mitteness, 1993); older adults living in extended care facilities are more likely to receive laxatives on a regular basis than are their community-dwelling peers (Pahor, Guralnik, Chrischilles, & Wallace, 1994). Chronic constipation—constipation that continues for 3 months

or longer—is the most prevalent functional bowel disorder (O'Keefe, Talley, Tangalos, & Zinsmeister, 1992). Constipation induced by opioids is common in persons who are terminally ill.

A regular pattern of emptying the bowels is perceived as being important to health and well-being (Dykes, Smilgin-Humphreys, & Bass, 2001; Schaefer & Cheskin, 1998). Because individuals define regularity of bowel patterns differently, it is difficult to define constipation and to document its incidence.

EPIDEMIOLOGY AND PREDISPOSING FACTORS

Using self-report criteria, the incidence of constipation ranges from 17% in the general population (Drossman, Sandler, McKee, & Lovitz, 1982; Heaton & Cripps, 1993; Stewart, Moore, Stat, Marks, & Hale, 1992) to 8.2% in middle-aged persons (Thompson & Heaton, 1980), and to a high of 30% in older adults (Whitehead et al., 1989). Using the criterion of two or fewer bowel movements weekly, approximately 5.9% of persons below the age of 40 years and 4%–6% of persons aged 70 and older report having persistent constipation (Harari et al., 1996). The highest reported incidences of constipation in specific populations were 45% of all patients with cancer (McMillan & Williams, 1989), 45% of all frail elders (Wolfsen, et al., 1993), and 46% of all hospitalized elders (Wright, 1984).

The incidence of constipation increases with age (Campbell, Busby, & Horwath, 1993; Harari et al., 1993; Harari et al., 1996; NIDDK, 1995**;** NCHS, 1997; Stewart et al., 1992). Women report being constipated more often than do men (Campbell, et al., 1993; Harari, Gurwitz, Avorn, Choodnovskiy, & Minaker, 1994; Heaton & Cripps, 1993; Moore-Gillon, 1984; NIDDK, 1995; Ross, 1995; Stewart et al., 1992). Constipation is a common problem in pregnancy and after childbirth or surgery (NIDDK, 1995). The incidence of constipation increases in people with diminished functional and cognitive ability and in the frail elderly (Campbell et al., 1993). Studies also have reported more frequent episodes of constipation in African Americans and persons in lower socioeconomic groups (Everhart et al., 1989; Johanson, 1998).

One-fourth of the United States population report having altered bowel function at least 25% of the time, with 17.5% reporting that they have straining with defecation (Drossman et al., 1982). Chronic idiopathic constipation has both physical and psychological impacts (Dykes et al.,2001). Persistent stretching of the pudendal nerves may ultimately result in complications such as hemorrhoids, rectal prolapse, or incontinence. The psychological impact of constipation is often the result of changes in activity levels that often leads to increased isolation (Koch & Hudson, 2000).

An organic cause of constipation cannot be identified in most people (Mertz, Nalliboff, & Mayer, 1999). Predisposing factors include (**Appendix A**) lifestyles, iatrogenic causes, and secondary causes. Fifty percent of persons with chronic constipation have abnormal rectal

emptying, while the remainder have normal or slow transit problems, many of which are attributable to irritable bowel syndrome (Surrenti, Rath, Pemberton, & Camilleri, 1995).

Situations that place people at risk for acute constipation include imposed immobility, a change in toileting habits, dietary changes (whether self-imposed by dieting or for medical reasons), medications, and stress. The most common predisposing factors for chronic constipation include advanced age, being female, poor fluid and dietary intake, cognitive or functional impairment, ongoing privacy issues, and polypharmacy. Opioids are among the major medications that predispose patients to constipation (Levy, 1991; McMillan & Williams, 1989; Sykes, 1996). The research documenting the causes of constipation is inconsistent; most of the identified etiologic factors in the literature are case reports, anecdotes, or clinical observations (Campbell, et al., 1993; Harari, Gurwitz, Avorn, Choodnovskiy, & Minaker, 1995; Knowles, Scott, & Lunniss, 2001; Sandler, Jordan, & Shelton, 1990; Whitehead et al., 1989)

ANATOMY AND PHYSIOLOGY

Pathophysiology of Constipation

The colon absorbs water and electrolytes from the chyme, and stores fecal matter until it can be eliminated (Guyton & Hall, 1996). The colon is approximately 1.2 m long and is bounded by the ileocecal sphincter at its origin and by the anal sphincter at the perineum (Rothenberger & Orrom, 1991). It consists of the following segments: cecum; ascending, transverse, and descending colon; sigmoid colon; rectum; and anus. The role of the proximal half of the colon is absorption and the role of the distal half is storage (Guyton & Hall, 1996).

The colon wall has several layers: the inner mucosal lining, the submucosa, and an outer layer of muscle that has two divisions—the inner layer, which is a continuous sheath of circular smooth muscle, and the outer longitudinal layer (Rothenberger & Orrom, 1991).

The nerve supply to the colon has intrinsic and extrinsic components. The colon wall contains the intrinsic components that include Auerbach's plexus and Meissner's plexus. Auerbach's plexus, also known as the intramuscular myenteric plexus, is located between the longitudinal and circular muscle layers. Meissner's plexus is located in the submucosa; it generally controls gastrointestinal secretion and local blood flow, while Auerbach's plexus controls the gastrointestinal movements (Guyton & Hall, 1996). The intrinsic component is also known as the enteric nervous system and its function is to coordinate much of the colonic wall movement that mixes and advances stool through the colon (Consortium for Spinal Cord Medicine, 1998).

Two types of movements occur in the colon. One is propulsive movement, or peristalsis, that occurs when a segment of the colon is excited by distension, causing a contractile ring around the colon. This ring moves forward, propelling forward any material in front of it. Peristalsis theoretically can occur in either direction from the stimulated point; however, the peristalsis

normally dies quickly in the oral direction while continuing for a considerable distance toward the anus. Effective peristalsis requires an active myenteric plexus because peristalsis is weak if the myenteric plexus is congenitally absent, or if its function is inhibited by disease or anticholinergic medication (Guyton & Hall, 1996).

The second type of colonic movement is haustrations, or mixing, movements. When a portion of the colon wall becomes distended, the stretch of the intestinal wall elicits localized concentric contractions. These contractions slowly dig into and roll over the fecal material in the colon, exposing it to the surface of the large intestine, where fluid and dissolved substances are absorbed (Guyton & Hall, 1996)

The extrinsic nerve supply is through the autonomic nervous system's sympathetic and parasympathetic components. The parasympathetic innervation is through the vagus nerve for the proximal colon and through the sacral parasympathetic nerves for the distal colon and rectum. The sympathetic innervation is from the thoracolumbar outflow. The extrinsic nerve supply terminates on the nerves of the intrinsic plexuses. If the colon is denervated of its external nerve supply, it is still capable of coordinated peristalsis through its intrinsic plexuses (Rothenberger & Orrom, 1991).

Movement of material through the colon depends on the combination of haustral contractions and mass movements. Most of the propulsion in the cecum and ascending colon results from slow, persistent haustral contractions, which may require 8 to 15 hours to move the chyme from the ileocecal valve through the transverse colon. During this time the chyme becomes fecal in quality and becomes a semisolid slush instead of a semifluid (Guyton & Hall, 1996)

At the transverse colon and through the sigmoid colon, mass movements take over the propulsive function. Mass movements usually occur only 1 to 3 times a day, usually after a meal. They are facilitated by the gastrocolic and duodenocolic reflexes, and are strongest for about 15 minutes in the first hour after breakfast. These mass movements are initiated when a constrictive ring forms in response to distension or irritation at a point along the colon, most frequently the transverse colon. This causes 20 cm or more of colon distal to the constrictive ring to lose its haustral contractions and contract instead as a unit. This action forces the fecal material in that segment down the colon. The series of mass movements persists for only 10 to 30 minutes, then returns in 12 hours, or even a day, later. When the mass movements have forced the feces into the rectum the need to defecate is felt (Guyton & Hall, 1996).

Normal transit times through the colon vary greatly. Transit time can be measured clinically by radiopaque colonic transit time studies. Patients swallow 20 radiopaque markers and radiographs of the abdomen are taken to trace their passage through the colon (Rothenberger & Orrom, 1991). Persons with normal bowel function excrete 80% of the markers in 5 days (Hinton, Lennard-Jones, & Young, 1969). Stool transit time through the colon is affected by diet, exercise, time of day, and changes in normal surroundings (Holdstock, Misiewicz, Smith, & Rowlands, 1970). Eating increases the electrical and motor activity (Holdstock et al., 1970), causing a decrease in transit time and more frequent stools. Exercise has a similar effect on transit time. An

increase in the bulk of the stool also decreases transit time (Painter, Almeida, & Colebourne, 1972).

Normal defecation comprises synchronized autonomic and voluntary functions. (Scharli & Kiesewetter, 1970). It is postulated that a fecal bolus is propelled into the rectum by a mass peristaltic wave, causing distension and initiating the defecation reflex. This produces a series of responses that is initiated by the sensory receptors within the rectal wall and in the pelvic floor muscles. Central nervous system transmission of sensory input allows recognition of rectal fullness (Barnes & Lennard-Jones, 1985). This rectal distension causes reflex inhibition of the internal sphincter (Denny-Brown & Robertson, 1935) (the rectosphincteric reflex) through the myenteric plexus (Floyd & Wells, 1953), thereby lowering the anal canal pressure.

The puborectalis muscle and striated external anal sphincter (voluntary sphincters) that normally are tonic at rest and during sleep (Floyd & Wells, 1953), contract reflexively upon rectal distension to maintain continence (Ihre, 1974). During normal defecation, the voluntary sphincters are inhibited (Parks, Porter, & Melzak, 1962) through reflex or cortical pathways (Frenckner, 1975) by the pudendal nerve and the S3 and S4 motor roots, which supply the puborectalis (Percy, Neill, Swash, & Parks, 1981). Relaxation of the puborectalis muscle widens and lowers the anorectal angle, which obliterates the flap valve effect of the angle while inhibition of the external anal sphincter relaxes the anal canal. The increase in the intra-abdominal pressure associated with rectosigmoid peristalsis permits rectal evacuation (Barnes & Lennard-Jones, 1985).

If the defecation reflex occurs during a socially inappropriate moment, the external sphincter can be contracted to prevent defecation. If it is kept contracted, the defecation reflex diminishes after a few minutes and remains quiet for several hours or until more stool enters the rectum. When it is convenient to defecate, a new reflex can sometimes be elicited by performing a valsalva maneuver to force fecal material into the rectum. The reflex initiated in this manner is usually not as effective as reflexes that are stimulated naturally. Therefore, people who often inhibit their natural defecation reflex are at risk to become constipated (Guyton & Hall, 1996).

Altered physiology factors such as slowed transit time, altered fecal composition, decreased ability to expel feces, and altered ability to acknowledge the urge to defecate may cause constipation.

Slowed transit times. Slow transit times for ingested radio-opaque markers are infrequent in patients who are constipated. Many of these patients, who almost exclusively are younger women, also have abnormalities of expulsion, and it is unclear whether the slow transit times or the expulsion abnormalities are responsible for their symptoms (Preston & Lennard-Jones, 1985). Research has not found that a decrease in colonic transit time is a result of aging alone (Camilleri, Lee, Viramontes, Bharucha, & Tangalos, 2000). Anatomical abnormalities such as constrictions from peritoneal adhesions or volvulus can cause constipation and are identified by conventional radiographic studies or endoscopy.

Transit times may be delayed because of slow gastric emptying, slowed small bowel transit, or slowed colonic transit. Marked slowing of transit times through the colon is sometimes

referred to as "colonic inertia." It may be generalized throughout the colon or it may be segmental in the ascending colon, the transverse colon, the descending colon, the sigmoid colon, or the rectum. Slowed colonic transit may result from abnormalities in any of the three primary transmission mechanisms that produce normal colonic motility—chemical, neurogenic, and myogenic.

In persons who complain of infrequent bowel movements without pain or strain associated with evacuations, and with normal stool consistency, slow transit may be responsible for the infrequency. Marked dilatation of the rectum may develop when there is very low compliance of the rectal wall. Intrinsic defects in a localized segment of the colon, rather than impairments in extrinsic motor control, may produce chronic megacolon (von der Ohe, Camilleri, & Carryer, l994).

Patients with normal pelvic floor function, normal anorectal dynamics, no colonic dilatation on contrast barium radiography, and no evidence of underlying neuropathology have chronic colonic pseudo-obstruction, severe idiopathic constipation, or "colonic inertia." In these people, stool moves slowly through the colon.

Altered fecal composition. Fiber is the one substance that extensive study has shown to inhibit constipation. The volume of fecal material is related to the volume of ingested fiber. Water content of feces is another factor. Delayed transit through the ascending colon may lead to increased absorption of water from the fecal contents, but this has not been proven. Delayed stool transit time is believed to be the reason why opioid medications cause constipation. Opioids affect the myenteric plexus, which coordinates peristalsis (Levy, 1991; Sykes, 1996). Colonic bacteria also influence fecal composition, but their role in causing constipation is unknown.

Decreased ability to expel feces. Abnormal function of the pelvic floor and the external anal sphincter (EAS) may also cause constipation. Many constipated patients have a paradoxical contraction of the pelvic floor and the EAS. This contraction occurs with straining or with the entry of stool into the anal canal, or both. Pelvic floor electromyography (EMG) and defography can demonstrate persistent or increased pelvic floor activity, indicating functional colonic outlet obstruction (Barnes & Lennard-Jones, 1985). The positive results of biofeedback training to learn how to relax the pelvic floor musculature in constipated patients supports the theory that abnormal pelvic floor function during defecation straining causes many cases of functional constipation. Whether this is due to a disturbed spinal reflex or is produced by a central effect is not known. Lack of inhibition and paradoxical contraction of the puborectalis muscle may be a cause of idiopathic megarectum (Barnes & Lennard-Jones, 1985). Similarly, patients with a neurogenic bowel may develop reflex spasticity of the EAS and pelvic floor when the rectum is full and the internal rectal sphincter is stretched.

Altered ability to acknowledge the urge to defecate. Patients with sensory loss, for example, after spinal cord injury, may not have a sense of fullness in the rectum. Similarly, patients with dementia or psychosis, or who are "too busy" to respond to a sensation of fullness in the rectum ("nature's call"), may develop constipation. Mechanisms that can cause constipation through nonresponse to the defecation urge are believed to be overdistension of the rectum with

hardening of fecal content from greater water absorption, and loss of the ability to allow the normal reflex inhibition to happen when a spontaneous propulsive contraction of the sigmoid-rectal colon occurs. When voluntary straining with the abdominal muscles occurs, the pelvic floor muscles further contract, creating a cycle of obstipation symptoms from altered defecatory mechanisms.

Some people may have a combination syndrome. Especially common is a painful combination of slow transit and evacuation disorders. This most often is seen in patients with irritable bowel syndrome (IBS) (Locke, Pemberton, & Phillips, 2000a).

EVALUATION AND TREATMENT RECOMMENDATIONS

Assessment

Obtaining a detailed history of a person who is constipated is the most essential step in identifying causative etiologic factors. First, the patient should be asked how he or she defines constipation. Second, the onset, the severity, and the duration of each symptom in relation to the person's usual pattern should be recorded. A focused history will include the following.

Description of bowel patterns. This should include usual patterns as to frequency and amount, as well as changes in bowel patterns. Question as to when the change in bowel patterns was first noted and the relation of changes in bowel patterns to other life events. The patient should be questioned specifically about the need for, and extent of, straining or any other symptoms. Questions should also be asked about any incontinence, the color, size, and consistency of stool, fecal staining, bloating, fullness, discomfort, abdominal pain, and rectal pain or bleeding. A 2-week record of bowel function can facilitate evaluation because patients may have poor recall as to the frequency of their bowel movements. The record should include frequency of movements, character of stool, and any associated symptoms (Moore, Bourret, & Cabico, 1999). The nurse should ask how frequently the patient has the urge to defecate and how he or she responds to that urge (Locke et al, 2000a). Pain should be assessed if the patient complains of abdominal pain.

Evaluation of cognitive ability. If a cognitive impairment is suspected during the initial interview, the Mini Mental Status Examination (MMSE) should be administered to the patient.

Environmental factors. The patient should be asked whether his or her normal environment has been changed because of factors such as privacy, toileting patterns, or toilet accessibility.

Cultural beliefs. The effect of cultural beliefs should be evaluated to determine the appropriateness of questions to be asked. A question such as "What do you believe is a normal bowel routine for you?" may elicit the patient's cultural beliefs and expectations.

Functional ability. The patient should be asked about his or her current functional abilities. Recent changes in those abilities can be elicited by asking a question such as "Have your daily activities or exercise patterns changed in the past year?". Of course, an observational evaluation of functional ability in an institutional setting may not reflect a person's functional ability in the community.

Diet and fluid intake. A diet assessment should be made as part of the health history to determine nutrient and fiber intake. Keeping a 3-day food history is a practical way to assess the patient's usual dietary intake. Amounts and types of fluids should be included in a diet history. The patient should be asked if he or she has experienced nausea, dysphagia, mastication difficulties, vomiting, or anorexia. Any fluid loss resulting from ostomies, fistulas, and drainage tubes should be evaluated.

Medication review. The patient's prescription and over-the-counter medications must be recorded. Special focus should be given to medications identified as predisposing an individual to constipation (such as opioids) and to current and past use of laxatives, including herbal remedies.

Medical & surgical history. Both histories should focus on potential etiologic factors that can cause constipation.

Objective measures. There are several instruments available with which to evaluate constipation. The Constipation Assessment Scale (CAS) (McMillan & Williams, 1989) (**Appendix B**) and the Elderly Bowel Symptom Questionnaire (O'Keefe et al., 1992) are two such instruments.

RECOMMENDATION: Obtaining a detailed history of the person with acute constipation is the most essential step in identifying potential etiologic factors.
RATIONALE: Since most causes of acute constipation include imposed immobility, change in toileting habits, dietary changes, medications and stress, a detailed history of onset and associated lifestyle may identify the etiologic factors (Prather & Ortiz-Camacho, 1998).
EVIDENCE: Expert opinion, nonexperimental studies.

RECOMMENDATION: Treating people with chronic constipation requires an in-depth history of their bowel patterns, toileting habits, and dietary habits, as well as a detailed health assessment and medical and medication history.
RATIONALE: The most common predisposing factors for chronic constipation include advanced age, being female, poor fluid and dietary intake, cognitive or functional impairment, ongoing privacy issues, use of opioid medications, and polypharmacy. (Campbell et al., 1993; Harari et al., 1995; Knowles et al., 2001; Levy, 1991; Sandler et al., 1990; Sykes, 1996;Whitehead et al., 1989). Fifty percent of persons with chronic constipation have abnormal rectal emptying, with the remainder having normal or slow transit problems, many of which are attributable to irritable bowel syndrome (Surrenti et al, 1995).
EVIDENCE: Expert opinion, nonexperimental studies.

RECOMMENDATION: Healthcare providers should ask patients how they define constipation, specifically as to frequency, character of stools, and associated symptoms.
RATIONALE: Lay persons and health professionals define constipation differently. Whereas health professionals define constipation in terms of frequency of bowel movements, lay persons most often use associated symptoms to define constipation (Whitehead et al., 1989; Connell et al., 1965; Harari et al., 1996; Ross, 1990; Towers et al., 1994; Fallon & O'Neill, 1997; Moriarity & Irving, 1992).
EVIDENCE: Expert opinion, nonexperimental studies.

RECOMMENDATION: A diet assessment to determine nutrient and fiber intake should be part of the health history. A follow-up to the usual diet assessment should include a 3 to 7 day prospective dietary record of pattern and intake. A quick method for assessing fiber intake per serving is as follows: fruit or vegetable =1.5 g, refined grains = 1 g, and whole grains = 2.5 g.
RATIONALE: Retrospective self-reports are not a reliable method of assessing dietary intake.
EVIDENCE: Expert opinion.

Physical Examination

The focused physical examination includes the following assessments. The extent to which advanced diagnostic evaluation is indicated depends on the patient's history of constipation, the constipation's accompanying symptoms, and the clinician's ability to readily identify its etiology (Marshall, 1990).

Physical function. Assessments of balance, transfer ability, and range of motion may be indicated.

Oral. Assessment should give particular attention to dentition and the presence of malodorous breath.

Abdominal. A complete abdominal assessment includes observation, auscultation, percussion, and palpation. The presence or absence of distention, abdominal muscle tone, visible peristalsis, bowel sounds, borborygmi, masses, rigidity, and tenderness should be documented.

Rectal. This examination will detect fissures, hemorrhoids, masses, stool, prostate size and characteristics, perianal ulceration, and anal sphincter tone. It is best performed with the patient in the left lateral position (Locke, Pemberton, & Phillips, 2000b). Resting and squeezing maneuvers of the external sphincter should be assessed. Finally, the patient should be asked to attempt to expel the examiner's finger so that expulsive forces can be evaluated. A vaginal examination to assess for a potential rectocele should be given to female patients.

Neurologic. A neurologic evaluation, especially of the anal reflex using a light pinprick or scratch, should be performed.

Additional Evaluation

With or without a clearly identifiable etiologic cause of a patient's constipation, the following initial tests may be indicated.

Laboratory. Fecal occult blood testing (FOBT); thyroid function studies; serum electrolytes; serum glucose; and complete blood count (CBC).

Radiographic diagnostic testing. Such testing of the kidney, ureter, and bladder (KUB)may be indicated to rule out an organic cause of constipation. (Constipation may present with clumps of rounded masses with entrapped gas and varying degrees of dilated bowel)

Additional evaluation is indicated if there is a positive occult blood test, weight loss, anemia, and an onset of constipation that cannot be attributed to lifestyle changes. Appropriate tests include a barium enema, a colonoscopy, and sigmoidoscopy.

Advanced evaluation. Failure to identify a cause in chronic constipation may indicate the need for a referral for advanced evaluation, which may include defecography, pelvic floor electromyography, anorectal manometry, balloon expulsion tests, dynamic imaging, proctography, scintigraphic expulsion of artificial stool. Colonic transit tests include radiopaque marker transit test and intraluminal testing.

Differential Diagnosis

Through differential diagnosis, a clinician may determine if any of the following conditions are responsible for the patient's constipation: colon mass, bowel obstruction, irritable bowel syndrome, rectoanal fissures, diverticulosis, depression, and hypothyroidism.

RECOMMENDATION: No further initial workup may be necessary in healthy adults presenting with recent onset constipation due to an identifiable acute etiologic factor (e.g., imposed immobility due to surgery, change in dietary or toileting habits, short term opioid use, or stress), and who meet all of the following criteria: under the age of 50 with no risk factors for colorectal cancer; a negative fecal occult blood and normal initial laboratory tests; a negative abdominal and rectal examination; and who have responded to initial therapy.
RATIONALE: The most common causes of constipation are imposed immobility, change in toileting habits, dietary changes, narcotics, and stress. In most persons, an organic cause cannot be identified (Mertz et al., 1999; Chattat et al., 1997; Stewart et al., 1992; Whitehead et al., 1989; Wong et al., 1999).
EVIDENCE: Expert opinion, nonexperimental studies.

RECOMMENDATION: A comprehensive physical examination and appropriate laboratory tests should be given to people who have chronic constipation (persisting for 3 months or longer), or whose constipation does not have a readily identifiable etiology. The physical examination should include a digital examination. Fecal occult blood tests should be obtained on three separate bowel movements. Persons over the age of 50 should be screened for colorectal cancer.
RATIONALE: Additional testing is often required to differentiate whether the cause of constipation is an organic disorder or is secondary to another condition (Locke et al., 2000a). Screening for colorectal cancer is recommended for all patients, beginning at age 50. The American Cancer Society prefers yearly fecal occult blood testing, using the take-home multiple sample method, combined with flexible sigmoidoscopy every 5 years. Persons with colorectal cancer risk factors should begin colorectal cancer screening earlier or undergo screening more frequently, or both (American Cancer Society, 2001)
EVIDENCE: Expert opinion.

Complications of Constipation

Complications of constipation include the following physical alterations and symptoms: anorexia, overflow incontinence, confusion, nausea and vomiting, urinary dysfunction, impaction, fissures, rectal prolapse, hemorrhoids, bowel obstruction, and syncope. It may also lead to anxiety and social isolation (Koch & Hudson, 2000):

MANAGEMENT OF CONSTIPATION

Toileting Activities

Toileting activities have been studied mainly in combination with other interventions, so their independent contributions to bowel function generally cannot be determined. Thus, the following guidelines on toileting habits, defecating positions, and toilet facilities are based on generally accepted opinion and, where possible, on research evidence.

TOILETING HABITS

RECOMMENDATIONS: Toileting habits should consist of the following:

1.Promptly respond to the urge to defecate.

RATIONALE: The defecation reflex that causes the urge to defecate diminishes after a few minutes and may remain quiet for several hours. Attempts to initiate the defecation reflex artificially are not as effective as naturally stimulated reflexes, so stool may have prolonged contact with the mucosa, causing it to harden and making it more difficult to expel (Guyton & Hall, 1996 ; Waldrop & Doughty, 2000).
EVIDENCE: Expert opinion.

2.Provide a consistent time for defecation, usually after a meal but that also takes into consideration the person's usual time for defecation and his or her everyday living demands. Morning may be better than evening for defecation.

RATIONALE: Mass movement of feces is strongest for about 15 minutes in the first hour after a meal (Guyton & Hall, 1996) and is facilitated by the gastrocolic and duodenocolic reflexes (Guyton & Hall, 1996; Harari et al., 1993; Leslie, 1990). It has been suggested that 30 to 40 minutes after a meal is the best time to toilet because of the stimulation of the gastrocolic and duodenocolic reflexes (Harari et al., 1993; Leslie, 1990). A study of stroke patients found that a morning bowel program was more effective than an evening program, and effectiveness was best when the time coincided with a person's usual defecation time (Venn, Taft, Carpentier, & Applebaugh, 1992). It is especially important to set a consistent defecation time for people with cognitive impairment and depression because they are at high risk to delay defecation (Harari et al., 1993). For patients who require assistance, such as the bed-bound, it is important to establish toilet times that take into consideration the caregiver's constraints. This will help to ensure consistency and caregiver participation (Benton, O'Hara, Chen, Harper, & Johnston, 1997).

EVIDENCE: Expert opinion; nonexperimental and experimental studies.

3.Provide as much visual, olfactory, and auditory privacy as is possible.

RATIONALE: A bowel movement in a public facility or in close proximity to others may cause the person to suppress the urge to defecate because of embarrassing sounds and smells (Hall, Karstens, Rakel, Swanson, & Davidson, 1995; Waldrop & Doughty, 2000).

EVIDENCE: Expert opinion.

POSITION

RECOMMENDATION: An upright position is recommended for the person who is defecating. If expelling feces is difficult, placing a footstool in front of the toilet or beside the commode, or manually pushing the legs toward the abdomen in bed-bound patients are ways to simulate a squatting position. Such positions facilitate defecation, especially in elderly patients and patients with Parkinson's disease.

RATIONALE: Sitting decreases the acuity of the anorectal angle and promotes the movement of the feces into the anal canal (Waldrop & Doughty, 2000). Bending the legs toward the abdomen, either with a footstool or manually, facilitates the use of abdominal pelvic floor muscles to help with defecation (Harari et al., 1993; Leslie, 1990; Waldrop & Doughty, 2000). Elderly patients are likely to have difficulty expelling feces due to decreased abdominal muscle strength (Hall et al., 1995). Persons with Parkinson's disease have difficulty expelling feces due to dysfunction of the pelvic floor musculature (Ashraf, Pfeiffer, & Quigley, 1994).

EVIDENCE: Expert opinion; experimental and nonexperimental studies.

RECOMMENDATION: If a patient is unable to sit when defecating, a left-side-lying position is recommended. Incontinence pads can be used to catch the feces.

RATONALE: A left-side-lying position facilitates movement of feces across the transverse colon and into the descending colon (Sharkey & Hanlon, 1989).

EVIDENCE: Expert opinion

TOILET FACILITIES

RECOMMENDATION: A toilet or bedside commode should be used for defecation. Every effort should be made to avoid the use of a bedpan.

RATONALE: Both the unnatural position and the resulting discomfort of sitting on a bedpan may inhibit the urge to defecate (McConnell, 1988).

EVIDENCE: Expert opinion.

RECOMMENDATION: Toilet facilities may need to be wheelchair accessible. Persons with mobility impairments would benefit from a padded raised toilet seat with backrest and side rails.
RATONALE: Some patients may not be able to bend at the knees or hips because of joint mobility restrictions (i.e., patients with total hip or knee replacements). Others may have difficulty rising from a sitting to a standing position (i.e., persons with arthritis, weakness, or back problems).
EVIDENCE: Expert opinion.

Lifestyle Factors

Dietary habits. Dietary adequacy is based on the nutrient needs of, or recommended allowances for, people by gender and age groupings. A diet that prevents constipation will include all nutrients and fiber essential to providing sufficient energy and maintaining health. Dietary Reference Intakes (DRIs) (Institute of Medicine, 1997) were developed as a series of reports of dietary reference values for Americans and Canadians. The DRIs will replace the Recommended Dietary Allowances (RDAs) (Food and Nutrition Board, 1989) and set dietary goals for healthy people.

Nutrients in the diet include carbohydrates, protein, fat, water, vitamins, and minerals. The ingestion, metabolism, and utilization of food and nutrient intake are affected by many factors, including heredity, physical activity and mobility, physical and mental status, and medications. To prevent constipation, adults should follow a balanced diet that varies daily and that adheres to the serving guidelines found in the USDA Food Guide Pyramid (U.S. Dept of Agriculture, 2000). The serving guidelines include a foundation of 6 to 11 servings of grains and cereals and 5 to 9 servings of fruits and vegetables daily.

The laxative effects of dietary fiber have been recognized (Slavin, 1987) since Hippocrates in 430 b.c. noted the value of ingesting coarse wheat to prevent constipation. Sporadic research published in the 1930s called for clinical trials to establish the effect of fiber on disease entities and to find ways to measure crude fiber content in foods (Slavin, 1987).

Dietary fiber. Fiber is a complex carbohydrate that often contains vitamins and minerals. Not all fiber sources have the same physiological effect and therefore are classified by solubility. Soluble fibers (pectins and gums found in fruits, vegetables, and oat bran) either expand or dissolve in water. They form bulk in the small intestine and are digested in the large intestine by bacteria. Insoluble fibers (cellulose, lignin, and some hemicelluloses, found in whole wheat, wheat bran, corn bran and fibrous vegetables) pass through the small intestine and form much of the bulk in the large intestine by holding water effectively, resulting in a softer, larger stool and speeding transit time through the colon (Slavin, 1987).

Fibrous foods, especially cellulose and other insoluble fibers, are important in preventing constipation. Since fibrous substances are poorly digested and remain in the lumen of the

gastrointestinal tract, they form viscous, gel-like substances, hold minerals loosely, and tend to bind chemical compounds. These properties result in significant interactions with nutrients that affect metabolism (Klurfeld, 1987). However, not all types of bran or fiber affect gastrointestinal motility or transit time in the same way, and their effectiveness may be altered by pathological disorders (Badiali, et al., 1995; Stephen, 1985; Volderholzer et al., 1997).

Low intake of fiber is of concern in the diets of Americans and is one reason fiber content is included on food labels. To encourage an increase in dietary fiber intake, "high fiber" on a food label indicates 5 g or more (U.S. Dept of Agriculture, 2000). Estimating fiber content is not routinely done when diets are evaluated. An estimate of fiber content in foods must take into consideration the fact that some of the health and physiological benefits are lost when foods are processed or refined.

Marlett and Cheung (1997) developed a database of 342 foodstuffs by chemically analyzing grams per serving of fiber and polymer concentration (cellulose, hemicellulose, lignin, and beta glucans) and soluble and insoluble fractions. They found that of the foods they analyzed, 75% had less than 2 g of fiber per serving and only 10% had 3 g or more of fiber content. Based on this analysis, the investigators developed a quick method to estimate fiber in the diet. The foods in the database are divided by five food groups (fruits, vegetables, legumes, nuts, and seeds) and by ranges of fiber content in grams. Using the quick method of 1.5 g in a fruit or vegetable serving (usually ½ cup for most fruits and vegetables), 1 g of refined grains, and 2.5 g of whole grains, daily total fiber intake can be estimated from a diet record or 24-hour recall. Some foods (i.e., grains, legumes, nuts, and seeds) cover a wide range of fiber content and should be calculated separately. Comparison of the quick method with the calculations of the actual fiber values indicates a difference within 10%. Also observed in this analysis were the effects of processing and peeling of fruits and vegetables, the possible varietal effects, and the higher fiber content of home-cooked foods (Marlett & Cheung, 1997).

Dietary fiber can affect the balance of nutrient intake by reducing the energy density of the diet and promoting postprandial satiety distension of the stomach and proximal intestine. Patients should be cautioned against suddenly increasing their fiber intake from 10 g per day to the recommended 20 to 35 g because excess fiber may cause abdominal distress, bloating, flatulence, cramping, and diarrhea. To avoid these symptoms, gradual increases in fiber are recommended. These side effects are more common with the ingestion of a fiber-rich diet (20–35 g per day) from a variety of food sources rather than from dietary fiber supplements. Fiber intake from food sources increases the likelihood of improved intake of minerals, other nutrients, and other constituents of the diet that have a protective effect on health.

Benefits of fiber. Epidemiological studies have uncovered the potential significance of higher fiber diets in undeveloped countries, as contrasted with the low fiber intakes and higher gastrointestinal and chronic diseases prevalent in developed countries (Trowell, 1976; Burkitt, Walker, & Painter, 1974). Another benefit is that by increasing fiber in the diet, fat consumption usually decreases (Klurfeld, 1987; Miller, Niederpruem, Wallace, & Lindeman, 1994). An inverse relationship with calories and fiber has also been observed in fiber regimens because of

the feeling of satiety from high fiber cereals and grains and the increased consumption of fruits and vegetables, which are notably lower in fat and calorie content. (Rimm et al., 1996; Evans & Shronts, 1992). (**Appendix C** provides a listing of high fiber foods. **Appendix D** describes ways to increase fiber in a diet. **Appendix E** describes the types of fibers.)

The benefits of fiber are realized only after several weeks of compliance (Marlett & Cheung, 1997). Fiber-rich diets increased bowel movement frequency and decreased oroanal transit time in clinic trials (Schmelzer, 1990; Stephen, 1985). Various food fibers have been tested, including wheat bran, psyllium seed, fiber concentrates, and guar gum. Guar gum is a water-soluble fiber derived from the seed of the cluster bean. A partially hydrolyzed form of guar gum was as effective as laxating agents in 21 patients (Patrick, Gohman, Marx, DeLegge, & Greenberg, 1998). Psyllium seed, lactulose, and guar gum have increased stool volume and moisture content (Harari et al., 1995). Bran in place of one teaspoon of psyllium seed taken twice daily with generous amounts of fluids has been effective. If this dosage is insufficient, slow incremental increases can be made to obtain the desired effect (Saltzman, 1999).

Fiber diets containing coarse or unprocessed wheat bran (2 teaspoons taken 3 times per day) have relieved abdominal symptoms, including distension, and have alleviated the need to exert considerable pressure when passing stools (Jenkins, Peterson, Thorne, & Ferguson, 1987). One study found that wheat bran was more effective in increasing fecal weight and moisture content than was corn bran (Graham, Moser, & Estes, 1982).

Numerous observational studies used 10 to 20 g of bran as an adjunct in prune juice, hot cereals, and puddings, or used fiber to decrease laxative use (Hull, Greco & Brooks, 1980; Pringle, Pennington, Pennington, & Ritchie, 1984; Hagberg, Fines & Doyle, 1987; Hope & Down, 1986; Beverly, 1992; Rodrigues-Fisher, Bourguignon & Good, 1993; Neal, 1995; Howard, West, & Ossip-Klein, 2000; Gibson, Opalka, Moore, Brady, & Mion, 1995; Pettigrew, 1997). These findings encouraged the development of bowel management programs in rehabilitation and long-term care facilities serving the elderly. However, obtaining fiber through diet alone is complicated by poor dentition, food preferences, and difficulty with mastication (Patrick et al., 1998). Concentrated fiber supplements should be promoted as part of a bowel management program only when whole dietary fiber is inadequate.

Concentrated fiber sources may be used to treat constipation when a limited number of foods is ingested or a diet is inadequate to meet energy requirements. They should be administered only after an assessment of a person's diet. Food records can be kept to monitor the effects of different foods and their side effects, such as flatulence and palatability changes. Food sources should first be used under careful monitoring by the healthcare team; the most successful food and fiber programs have stressed the importance of the involvement of physicians, nurses, and dietitians (Hull et al., 1980; Hagberg et al., 1987).

Enteral feedings should contain dietary fiber although the feedings' clinical benefits are modest (Evans & Shronts, 1992). Soy fibers appear to prevent intestinal atrophy and may decrease severe constipation in the elderly. Studies are still inconclusive and are complicated by individual tolerance levels.

A review of 21 randomized trials of laxative and fiber therapies with respect to clinical outcomes showed significantly improved symptoms of constipation and bowel movement frequency (Tramonte et al., 1997). Bowel movements increased on average to 1.4 per week. However, the individual contributions of fiber and bulking agents on improvement of stool consistency and lessened abdominal pain could not be clearly discerned because of the many weaknesses in the research designs. The trials were inconclusive because few studies used standardized techniques, and they were complicated by individual physiological responses to the ingestion of dietary fiber and laxatives. Often, patients withdrew or received enemas or suppositories after 3 days without bowel movements. Bulk-producing agents such as psyllium and bran provided variable results, with bran supplements ranging from 0.5 to 24 g per day. Twenty studies used single-action agents and compared them with a placebo, controlled diet, or discontinued treatment. Although some clinical symptoms improved, there was insufficient evidence to determine whether bran or fiber supplements were superior to laxatives. One lesson learned from the many studies is the need to standardize diets, because the effect of a mixed solubility diet with the use of a single agent is not known.

Although the intake of whole grains is strongly recommended by health groups, palatability is a problem for some people. Results of a questionnaire circulated by Auld et al., (2000) supported the need for nutrition education messages that encourage increased consumption of dietary fiber. The survey of 2,682 adults in the general population found that a readiness to decrease fat in the diet was easier that increasing fiber intake. The findings indicated that good taste and convenience were important and consumers were more willing to adopt fat-reducing behaviors than fiber-increasing behaviors.

RECOMMENDATION: The adult diet should contain 20 to 35 g of fiber per day to maintain normal bowel function. Individuals should be encouraged to eat fiber from a variety of sources. The diet should include whole grains, fruits, vegetables, legumes, seeds, and nuts. Tolerance of gradual increases in fiber content should be evaluated. Fiber in the diet should be increased gradually to the recommended amounts. As fiber is increased, fluid intake must also be increased to 2 liters per day. The benefits of fiber and fluid intake may not be noted for several weeks, so it is important not to discontinue their inclusion in a bowel program prematurely.

RATONALE: The American Dietetic Association (ADA) supports the inclusion of adequate amounts of dietary fiber from a variety of plant foods for maintaining health (ADA, 2000). The clearest benefit of fiber in the diet has been in reducing the incidence and severity of constipation (Klurfeld, 1987). These recommendations are supported by the National Cancer Institute , the American Heart Association, and the American Diabetes Association . The American Diabetes Association recommends a maximum dietary fiber intake of 50 g daily because of concern about binding trace minerals with high levels of fiber and phytates in food, especially calcium and zinc (ADA, 1987). The subcommittee of the Food and Nutrition Board of the tenth revision of the Recommended Dietary Allowances recommended consumption of a variety of fruits, vegetables, legumes, and whole grain cereals to achieve a desirable level of fiber intake, without setting a specific level, and by not adding fiber concentrates to the diet (Food and Nutrition Board, 1989). This guideline could be interpreted as recommending the

consumption of at least 2 to 3 servings of whole grains each day as part of total grain and cereal intake, 5 servings of fruits and vegetables daily and legumes at least once or twice a week (Schwartz, 1994).
EVIDENCE: Expert opinion, experimental studies.

When fiber is increased in the diet to 20 to 35 grams, fluid intake must also be increased to 2 liters per day. Adults need 1 ml/kcal of energy needs or 30 ml/kg of body weight of fluid daily when fiber intakes are increased.

Fluids. Water comprises approximately 80% of the human body at birth and decreases with age to about 60%. In addition to its role in transporting nutrients, oxygen, drugs, and waste products in the blood, and in regulating body temperature, an important function of water is to prevent constipation. Factors that increase fluid needs include exercise, high temperatures, low humidity, high altitude, high fiber diet, and increased fluid losses—often related to caffeine and alcohol consumption (Kleiner, 1999).

Although requirements vary widely among people, generally humans should consume at least 2 liters per day of liquids in the form of noncaffeinated, nonalcoholic beverages, soups, and other foods (Kleiner, 1999). Kleiner recommends a fluid intake of 2,900 ml per day for the average-sized man (70 kg) and 2,200 ml per day for women using a guideline of 1 ml/kcal of energy needs. Solid foods provide about 1,000 ml per day and an additional 250 ml is derived from water resulting from oxidation. A pregnant woman requires 300 ml of extra fluid per day and a lactating woman requires 750-1,000 ml above the basic requirement (Food and Nutrition Board, 1989). Total water and fluid intake should be included in any diet record. Future studies that measure dietary fiber intake should also closely measure fluid intake.

Constipation is one indication that an older adult may be dehydrated. Dehydration is not easily detected in the elderly because chronic dehydration can result from less than adequate replenishment of water over time. There is no uniform definition of dehydration, but rapid weight loss of greater than 2%–3% is a generally accepted definition (Weinberg & Minaker, 1995).

Regular monitoring of fluid intake is recommended for the elderly. The estimated amount required at baseline for adults more than 65 is 30 ml/kg of body weight. A minimum of 1,500-2,500 ml is the daily water intake required to replace urinary and fecal losses and insensible losses for older adults (Weinberg & Minaker, 1996).

Dietary Considerations for Older Adults. Older adults require special dietary attention because gastrointestinal function may be altered with advanced age. Important considerations in managing older adults are their individual tolerances, their energy intake, and maintenance of a balanced diet with adequate fiber and fluid. Older adults are at greater risk for malnutrition because of a myriad of factors (Saltzman, 1999). Particular attention should be paid to elders who eat poorly, lose weight involuntarily, or report problems with poor digestion and constipation. Gastric function, particularly colonic transit time, may be slowed. There is also a decrease in microflora and metabolic activity. Loss of lean body mass contributes to decreased bowel

motility, along with reported maldigestion and malabsorption and decreased production of digestive enzymes (Blumberg, 1997). Long-term use of laxatives can lead to fewer bowel movements and maldigestion of food and nutrients. For elders in nursing homes, or homebound older adults, energy needs may be low relative to body size (ADA, 2000) and nutrient-dense supplements, including additional fiber and liquids, may be necessary to prevent constipation. Vitamin and mineral intakes should be maintained at the same level as in younger adults, who may be more active and consume more calories.

Food and fluid intake of older adults should be evaluated. One to two servings of higher fiber foods (legumes, whole grains, cereal brans) or concentrated fiber sources may be necessary to maintain normal bowel function. Because the thirst sensation decreases with age, elders should resolve to drink from 6 to 8 ounce glasses of noncaffeinated, nonalcoholic liquids daily.

Chronic constipation in the elderly is often caused by a decrease in fiber-containing foods, inadequate fluid intake, lack of physical activity, and loss of bowel muscle tone. Relatively little is known about how aging affects the bioavailability of vitamins and minerals, although increasing fiber intake may negatively affect the bioavailability of calcium and zinc (Blumberg, 1997). Older adults on tube feedings will require special attention. (**Appendix G** provides a list of fiber content in enteral formulas)

RECOMMENDATION: For patients on tube feedings, products containing dietary fiber based on 10-15 g/1000 calories should be used.
RATIONALE: Fiber-containing formulas may be more expensive than standard formulas, despite a lack of substantial clinic evidence documenting their effectiveness. Dietary fiber normalizes bowel function in healthy individuals and sometimes reduces diarrhea in enterally-fed patients. People using these products require frequent monitoring.
EVIDENCE: Expert opinion, nonexperimental studies.

The frequent use of enemas, laxatives and stool softeners is believed to lead to increased constipation in older adults. For some institutionalized elderly patients, nothing will prevent constipation when laxatives have been used for many years (Harari et al., 1995). Much more study is needed about the effect of increasing dietary fiber in conjunction with a bowel management program for older adults of various ages, activity levels, dietary patterns, and with medication side effects and chronic illnesses.

Treating of constipation by increasing dietary fiber may be inappropriate for end-of-life patients. The increased fiber amounts may cause constipation because end-of-life patients commonly have limited fluid intake. Fiber without fluid absorbs what liquid is available in the bowel, resulting in more difficulty with movement and expulsion of feces (Levy, 1991; Sykes, 1996).

Other Lifestyle Considerations

Exercise and activity. Exercise is believed to shorten transit time through the gastrointestinal tract and thus enhance evacuation of stool (Meshkinpour et al., 1998); however, evidence as to the benefits of exercise has not been conclusive (Peters, DeVries, Vanberge-Henegouwen, & Akkermans, 2001). Additionally, lack of muscle tone as a result of inactivity decreases the facilitative function of the abdominal and pelvic floor musculature in evacuating stool (Waldrop & Doughty, 2000). Experimental studies of the effect of exercise on bowel function have not produced convincing evidence of its beneficial effects (Peters, et al 2001). Some studies found no effect of exercise on bowel function (Meshkinpour et al., 1998; Coenen, Wegener, Wedmann, Schmidt, & Hoffman, 1992). Others found contradictory effects (Bingham & Cummings, 1989; Robertson et al., 1993), and still others found that exercise enhanced bowel function (Cordain, Latin, & Behnke, 1986; Oettle, 1991). It is possible that the inconsistent results were the result of the samples' characteristics. Many of the study samples consisted of small numbers of healthy, young subjects with normal bowel function, which could limit the extent to which functioning could be improved. In spite of inconsistent research results, exercise is typically viewed as an important component of constipation prevention and management programs (Moore, Bourett, & Cabico, 1999).

Type of exercise: There are several types of exercises that can enhance bowel function, such as walking (Karam & Nies, 1994; Meshkinpour et al., 1998; Moore et al., 1999), pelvic tilt, leg lift, lower trunk rotation (Hall et al., 1995; Karam & Nies, 1994), stomach pulls, and stationary bicycling (Hall et al., 1995; Karam & Nies, 1994). However, there is no evidence to indicate that one type of exercise is better than another. The type of exercise selected should be based on feasibility and patient preference to ensure compliance (Moore et al., 1999; Hall et al., 1995; Karam & Nies, 1994).

Frequency, intensity, and duration: There are no evidence-based guidelines to help determine what frequency, intensity, and duration of exercise should be. It seems reasonable, however, that frequency and duration of exercise must be based on patient tolerance (Moore et al., 1999). In a well-controlled study of healthy volunteers who jogged and cycled for 1 hour per day for 2 weeks, bowel transit time was significantly reduced (Oettle, 1991). Jogging and cycling, however, may not be feasible for many patients. Walking 30 to 60 minutes per day or 3 to 5 times per week, may be beneficial for patients with minimal to no ambulation limitations (Meshkinpour et al., 1998; Robertson et al., 1993; Waldrop & Doughty, 2000). Patients with mobility impairments may benefit from daily abdominal and pelvic exercises, leg lifts, or just sitting up in a chair (Waldrop & Doughty, 2000; Karam & Nies, 1994).

Outcome evaluation: It is unclear how long it may take for exercise to have a beneficial effect on bowel function. It may depend in part on the intensity of the exercise. It seems reasonable that mild to moderate exercise (e.g., bed exercises and walking) would take longer to have an effect on bowel function than rigorous exercise (e.g., jogging). Research suggests that 4

weeks may not be sufficient to evaluate the effects of a walking program on bowel function (Meshkinpour et al., 1998), whereas 2 weeks may be enough to evaluate for a jogging exercise program (Oettle, 1991).

RECOMMENDATIONS: An exercise program should be a component of nursing plans to prevent and treat constipation.

RATIONALE: Exercise is believed to shorten transit time through the gastrointestinal tract and thus enhance evacuation of stool (Meshkinpour et al., 1998). Additionally, lack of muscle tone as a result of inactivity decreases the facilitative function of the abdominal and pelvic floor musculature in evacuating stool (Waldrop & Doughty, 2000). Although findings from experimental studies of the effect of exercise on bowel transit time have been equivocal, this may have been due to characteristics of the study samples and the intensity of the exercise, rather than a lack of effect of exercise on bowel function. Study samples have been small in number and, for the most part, have consisted of healthy young men and women whose bowel function may not have improved because of an already highly functioning bowel. Thus, further evidence is needed before definitive conclusions can be drawn about the effect of exercise on bowel function. Furthermore, exercise is not likely to harm patients and may benefit other body systems (e.g., cardiovascular system) as well as bowel function.

EVIDENCE: Expert opinion, experimental studies.

Pharmacological Factors

Laxatives are among the most common drugs sold over the counter. For many years these products were considered to cause little harm to individuals. While this may be true when the products are used on a limited basis, chronic long-term use does have detrimental effects. Chronic use of laxatives, stool softeners, and enemas by elderly persons has been associated with several significant clinical disorders, including diarrhea (Kinnunen et al., 1989; Duncan et al., 1992), hypermagnesemia (Kinnunen & Salokannel, 1987), life-threatening hyperphosphatemia (Korzets, Dicker, Chaimoff, & Zevin, 1992), hypoalbuminemia, an increased risk of fecal incontinence and perianal soiling (Harari, Gurwitz, Avorn, Choodnovskiy, & Minaker, 1994; Kinnunen et al., 1989), and poor response to bowel preparation for barium enema (Gurwitz, Noonan, Sanchez & Prather, 1992). (See Appendix G for a classification of laxative therapies.)

Pharmacological treatment of constipation empties the rectum of fecal contents and restores normal habits of defecation by altering stool consistency or its rate of passage in the intestine. This may be accomplished with several drugs, including laxatives, bulk formers, or softeners administered orally or rectally. The use of drugs to treat constipation is an extension of the dietary treatment. Early drugs used to treat constipation were herbs or natural laxative agents found in foods. Over the years, more complex chemical preparations have been created to treat constipation.

Pharmacological treatment of constipation is common in both the community and in healthcare institutions. Donald, Smith, Cruikshank, Elton, and Stoddart (1985) found in a survey of community-dwelling elders, that 93% had bowel movements within the accepted limits of thrice weekly to thrice daily, but 45% of this cohort was taking laxatives regularly. Pollman, Morris, and Rose (1978) found that 74% of long-term hospitalized geriatric patients were using some type of laxative. Researchers have documented excessive use of laxatives among people who did not meet the criteria for constipation (Connell, et al, 1965; Everhart et al., 1989; Harari et al., 1993; Kinnunen, 1991).

Similarly, studies of people treated in hospitals and long-term healthcare facilities have shown an extensive use of drugs to treat constipation (Harari et al, 1995).

In another study, Harari et al (1993) found that factors associated with the use of laxatives by residents in long-term care institutions included: being bed-bound; being diagnosed with Parkinson's disease; having had five or more illnesses; being incontinent; having been diagnosed with depression, or diabetes, or hypothyroidism; and the use of tricyclic antidepressants, iron supplements, calcium channel antagonists, and aluminum-containing antacids.

In a study of patients in hospitals and long-term healthcare facilities, Kinnunen (1991) found that 76% of hospitalized elderly and 74% of nursing home residents were prescribed at least one type of laxative.

Pharmacology does have a place in the treatment of constipation. The concern is the ease of access to over-the-counter drugs and their inappropriate administration in the community and in healthcare institutions. Pharmacological treatment is appropriate for an acute episode of constipation. Otherwise, there is consensus among experts that pharmacological treatment should be considered only after nonpharmacological interventions—such as diet and exercise—have been tried (Yakabowich, 1990; Harari et al., 1993; Tedesco & DiPiro, 1985). Pharmacological agents are not recommended for chronic use. Ideally, treatment should be short-term and time-limited until regular, timely, complete evacuation of stool is achieved. Orders for pharmacological agents in healthcare settings should be written as PRN rather than as scheduled medications, to encourage nurses to assess and evaluate the need for a laxative or stool softener.

Short-term, time-limited pharmacological treatment of constipation is important for several reasons. Routine use of pharmacological agents can be costly. Also, as the population ages and more individuals take multiple medications, there is a significant risk of interactions between these drugs and others.

Studies have also documented significant adverse effects and risks associated with both short-term and long-term laxative use. Excessive use of laxatives may cause colonic damage, thus exacerbating the problem of constipation (Read, Celik, & Katsinelos, 1995; Petticrew, Watt, & Sheldon, 1997). Petticrew et al., (1997) reported in their review of the effectiveness of laxatives in the elderly, that the chronic use of laxatives causes loss of colonic mobility and leads to intractable constipation. Nusko, Schnieder, Muller, Kusche, & Hahn, (1993) found significant risks for colorectal cancer among laxative abusers.

Pharmacological treatment considerations. Pharmacological treatment begins with assessment and evaluation of the person's complaint of being constipated. Through questioning and physical assessment, a diagnosis about the reason for the problem can be made and should form the basis for treatment. Contrary to popular belief, there is no ideal laxative; symptom relief is based on the appropriate choice of laxative. Bulechek and McCloskey (1999) cited the following areas to be considered when prescribing pharmacological treatment for constipation: factors contributing to the individual's constipation, including concurrent illnesses; side effects of the agents, including drug interactions; the patient's bowel management pattern and plan (pharmacological and nonpharmacological measures); opportunities to enhance nonpharmacological measures; research evidence on the effectiveness of the drug; invasiveness of the agent; and provider and patient preference.

Pharmacological treatment. Drugs used to treat constipation are called laxatives and are further classified by mechanisms of action—bulk-forming, emollient or softener, saline, hyperosmotic, stimulant, and mechanical—or by the way in which they are taken (orally or rectally) (Bulechek & McCloskey, 1999). Appropriate prescription of a laxative requires an understanding of how the different drugs work, their effectiveness when tested in research, and risks associated with their use.

Bulk-forming agents: The first category, the bulk-forming agents, increases frequency of bowel movements and softens stools by holding water in the stool (Ashraf, Park, Lof, & Quigley, 1995; Yakabowich, 1990; Tedesco & DiPiro, 1985). These agents require adequate hydration to achieve treatment goals and reduce the risk of complications; therefore, it is generally recommended that these agents be taken with a minimum of 250 cc of water. They should be avoided by patients with actual or suspected intestinal obstruction, low fluid intake, or swallowing difficulties. Bulk laxatives may be inappropriate for patients at the end-of-life because they are frequently unable to ingest sufficient fluids (Economou, 2001). They should also be used cautiously in patients with hypertensive disease or who are on a sodium restricted diet.

Bulk-forming drugs act similarly to dietary fiber to increase the frequency of bowel movements. These drugs have been shown to bind with and interfere with the absorption of many drugs. Yakabowich (1990) cautioned against the use of bulk forming agents with digoxin and salicylates. In contrast, Kinnunen & Salokannel (1989) and Nordstrom, Melander, Robertsson, & Steen (1987) found that these drugs do not cause the malabsorption of iron, fat-soluble vitamins or digoxin in the elderly, as was once suspected.

Bloating is the most common short-term treatment side effect of bulk-forming drugs (Hamilton, Wagner, Burdick & Bass, 1988). While many fear intestinal obstruction from bulk-forming drugs and emphasize the importance of adequate hydration to minimize the risk, it has not been documented that this has occurred. Early studies indicated that the drugs were not palatable, causing decreased compliance with treatment (Mamtani, Cimino, Kugel, & Cooperman, 1989; Rouse et al., 1991). More recent formulations of the drug have added sugar and flavoring to appeal to consumer tastes. If used long-term, the drugs can be costly. Synthetic preparations are a less costly alternative (Harari et al., 1993).

Researchers have compared pharmacological agents and bulk forming agents with dietary fiber in terms of their treatment effectiveness. Tramonte et al., (1997) listed six trials that evaluated bulk laxatives' effects on bowel function. Treatment resulted in an increase of 1.4 bowel movements per week, compared with controls. Clinical trials of laxatives that were not bulk forming showed increases of 1.5 bowel movements per week. Two studies of the effect of fiber laxatives on bowel function also showed significant symptom improvement, improved stool consistency, and fewer complaints of abdominal pain (Fenn, Wilkinson, Lee, & Akbar, 1986; Odes & Madar, 1991).

***Stool softeners*:** Another category of drugs used to treat constipation includes the emollients and lubricants, also known as surfactant or stool softeners. The drugs in this category "facilitate the mixture of aqueous and fatty substances in fecal material," thus resulting in softening that material (Tedesco & DiPiro, 1985), and ultimately making it easier to pass the stool. Docusate sodium (DSS) and docusate calcium are typically taken orally, although docusate potassium may be administered rectally. Harai et al., (1993), in a survey of residents in nursing homes, found that DSS was the most commonly prescribed laxative. For these drugs to be effective, it is essential that a person consumes at least 1 to 2 liters of fluid per day. These drugs are often prescribed because they do not alter colonic motility, but do affect stool consistency.

Common side effects of stool softeners include fecal incontinence ("A policy for laxatives," 1989) and loose stools. Tedesco and DiPiro (1985) and Yakabowich (1990) stated that these drugs have little value in the treatment of chronic constipation. Appropriate short-term use of these agents is beneficial to soften the stool resulting in increased ability to pass stool.

Researchers have examined the effectiveness of stool softeners as a single therapeutic intervention and have compared the effectiveness of several agents within this drug class to determine which is most effective. Hyland and Foran (1968) showed statistically significant improvement in the frequency and consistency with notable softening of the stool. Castle, Cantrell, Israel and Samuelson (1991) found no significant difference in quantity or quality of bowel movements between subjects given DSS and those given a placebo. Two studies (Williamson, Coll, & Connolly, 1975; Fain, Susat, Herring, & Dorton, 1978) showed no difference in bowel function between DSS and docusate calcium although the later did show docusate calcium to be statistically better than DSS if DSS was given at recommended dosages.

Saline laxatives: Saline laxatives have an osmotic effect that causes an increase in intraluminal volume and stimulates intestinal motility. The principal ingredients in these products include magnesium, sulfate, phosphate, and citrate ions. Saline laxatives are relatively fast-acting agents, typically resulting in a bowel movement within 30 minutes to 3 hours after being taken orally. Sodium phosphate products are available for rectal enemas, typically with bowel movements resulting in 5 to 15 minuntes. The American College of Gastroenterology's committee on FDA-related matters (Tedesco & DiPiro, 1985) recommended in 1985 that saline laxatives be used only for evacuation of the bowel before an endoscopic examination, to treat suspected poisonings, to eliminate parasites after anthelminthic administration, or—infrequently—to treat acute constipation.

Milk of magnesia, a saline laxative, accounts for approximately one eighth of all over-the-counter laxative sales (Harari et al., 1993). Common side effects include abdominal cramping, water stools, and the potential for dehydration and hypermagnesium. Because of these side effects, saline laxatives should be used only as a last resort for end-of-life patients (Economou, 2001). Consensus opinion recommends that magnesium levels be carefully monitored in patients using magnesium salt products (magnesium citrate, magnesium hydroxide, and magnesium sulfate) because toxic accumulation of magnesium can occur in extracellular fluid (Tedesco & DiPiro, 1985; Harari et al., 1993; & Yakabowich, 1990). The FDA in 1998 also recommended package size restrictions and modifications in labeling of rectal enema sodium phosphate products because of reported serious side effects and reports of overdosing ("Laxative drug products," 1999). Labeling now must include warning statements regarding use with patients with a colostomy, congenital megacolon, imperforate anus, impaired renal function, heart disease, congestive heart failure, preexisting electrolyte disturbances, or in patients using diuretics that may affect electrolyte levels (Food and Drug Adminstration, HHS. Final Rule, 1999). Saline laxatives should be used with caution when a patient is concurrently on tetracyclines, and with patients with renal and cardiac disease.

One study examined the effectiveness of saline agents on bowel function. Kinnunen and Salokannel (1987) examined the effectiveness of magnesium hydroxil, Laxamucil, plantain, and sorbitol on bowel function in 64 nursing home patients. The patients had statistically greater improvement in stool consistency and frequency and less need for laxatives when magnesium hydroxide was used, compared with the other drugs studied.

Hyperosmotic agents: Closely related to the saline laxatives are the hyperosmotic agents, primarily glycerin and lactulose. The osmotic properties of these agents increase intraluminal pressure and stimulate peristalsis. Glycerin is effective only rectally and typically works in 30 to 60 minutes. Lactulose is administered orally and may take from 24 to 48 hours to work.

Glycerin has minimal side effects and is one of the few laxatives that has been recommended as being safe for periodic use with children and infants. Lactulose has been known to cause transient flatulence, colic, abdominal cramps, diarrhea, and electrolyte imbalance such as hypernatremia, lactic acidosis, and acid base imbalance. While lactulose is often effective, patient compliance with routine use may be limited due to its unpalatable, overly sweet taste. More recent preparations have sought to improve the taste. Cost also may be a prohibiting factor because lactulose is presently one of the most expensive laxatives (Petticrew et al., 1997).

Several studies have evaluated the effectiveness of lactulose either as a single agent therapy or in comparison with other agents. Tramonte et al., (1997) reports that three studies found an increase in bowel movement frequency and improvement in stool consistency when lactulose was used with patients in nursing home and outpatient settings. When lactulose was compared with sorbitol (Lederle, Busch, Mattox, West & Aske, 1990); with fiber (Rouse et al., 1991, Kinnunen & Salokannel, 1987; Passmore, Davies, Flanagan, Stoker, & Scott, 1993); and with senna (Agra et al., 1998) there were no significant differences in frequency of bowel movements, although lactulose was reported to have had more symptom improvement than did sorbitol.

Stimulant laxatives: The stimulant agents are the anthraquinone derivatives (cascara sagrada, sennosides, danthron, and casanthrol) and the diphenylmethane derivatives (bisacodyl and phenolphthalein). These agents stimulate intestinal motor function by affecting fluid and electrolyte transport (Tedesco & DiPiro, 1985). In 1999 the FDA ruled that danthron and phenolphthalein are unsafe and prohibited their use in the United States. The FDA also recommended that all anthraquinone laxatives (aloe, cascara sagrada, and senna) and bisacoyl be tested for carcinogenicity because of their similarity to phenolphthalein (Food and Drug Administration, 1999).

Stimulant agents include oral preparations (bisacodyl, cascara sagrada, castor oil, and senna) as well as rectal suppositories (bisacodyl, senna). Typically, the agents act 6 to 12 hours after oral administration or 15 to 60 minutes after rectal administration. It is not uncommon for stimulant laxatives to cause severe abdominal cramping. With prolonged use, these laxatives may contribute to the development of electrolyte imbalances and cathartic colon. No controlled studies have been done to evaluate the effectiveness of stimulant agents in the treatment of constipation. Tedesco and Dipiro (1985) indicated that intermittent use (i.e., in preparation for endoscopic examinations) is acceptable.

Despite the widespread use of common laxatives, few studies have evaluated their effectiveness and safety. Several common themes emerged from reviews of the literature by Tramonte et al., (1997) and Petticrew et al., (1997). Both authors stress:

Before initiating any treatment, a comprehensive assessment is necessary to establish a diagnosis of constipation and direct treatment.

Dietary fiber and bulk laxatives increase frequency of bowel movements and, if at all possible, dietary measures and exercise should always be tried before use of laxatives are used.

Laxatives serve a purpose for short-term treatment of acute constipation, but are generally not recommended for long-term management or prevention, or both.

Additional studies with controls and large samples are needed to determine the efficacy of intraclass agents and interclass comparisons of laxatives.

Laxative use is not without risk and further study is needed to document the adverse effects of these agents so that appropriate warnings can be given to consumers, if necessary.

Patient education on the use of laxatives. Patients who report frequent use of laxatives need to be taught about the potential complications that can result from their long-term use. When prescribing laxatives to treat acute constipation, the primary healthcare provider should explain to the patient the rationale for the prescription. The patient should also be instructed to contact the provider if short-term use of the prescribed laxative fails to restore the patient's regular bowel routine. This will discourage the patient from attempting self-treatment with one or more of the many laxatives that are available over the counter.

RECOMMENDATION: If organic disease is not the cause of constipation, pharmacological treatment is appropriate on a short-term basis. It should be considered only after nonpharmacological interventions have failed.

RATIONALE: Pharmacological intervention does have a place in the treatment of constipation. The concern is the ease of access to over-the-counter drugs and inappropriate ordering and administration of prescription drugs in the community and in healthcare institutions. (Yakabowich, 1990; Tedesco & DiPiro, 1985).
EVIDENCE: Strong consensus.

RECOMMENDATION: Pharmacological treatment should be short-term and time-limited until the goal of regular, timely, and complete evacuation is achieved.
RATIONALE: Short-term, time-limited treatment is important for several reasons. Routine use of pharmacological agents can be costly. Also, as the population ages and more people take multiple medications, the incidence of drug-drug interactions increases. Studies have also documented significant adverse effects and risks associated with laxative use, both short-term and long-term. Excessive use of laxatives may cause colonic damage, thus exacerbating the problem of constipation (Read et al., 1995; Petticrew et al., 1997One retrospective study (Nusko et al., 1993) found significant risks for colorectal cancer among laxative abusers.
EVIDENCE: Retrospective and historical data document complications associated with long-term use of laxatives.

RECOMMENDATION: Orders for pharmacological treatment of constipation for individuals in healthcare institutions should be written as PRN and an assessment made to establish need for treatment and to direct appropriate use of different classes of laxative before instituting treatment.
RATIONALE: Pharmacological treatment begins with assessment and evaluation of the individual's complaint of constipation. Through questioning and physical assessment, a diagnosis regarding the source of the problem can be made and should form the basis for treatment. Laxatives may be further classified as bulk-forming, emollient or softener, saline, hyperosmotic, stimulant, suppositories, and enemas (Bulechek & McCloskey, 1999). Appropriate prescription of a laxative requires an understanding of how the different drugs work, the effectiveness of the drug when tested in research and common risks associated with drug use (Yakabowich, 1999; Harari et al., 1993; Tedesco & DiPiro, 1985).
EVIDENCE: Consensus

RECOMMENDATION: In addition to evaluating whether patients learn and remember material taught in an education program, nurses need to assess how confident their patients are in their ability to actually perform the activities related to prevention or management of constipation. It is known that patients who lack confidence in their ability to perform a health behavior are less likely to adhere to it. How confident the patient is about performing a behavior can be assessed by simply asking, "How much confidence do you have in your ability to actually _____?" (Identify the specific behavior such as "increase dietary fiber"). A scale of 1 to 5 can be used to assess the confidence level.
RATIONALE: Knowing what one must do to prevent or manage a health problem such as constipation is essential, but it is not sufficient to ensure that a patient will actually do what he or she has learned (Bandura, 1986). Patients' convictions about their capabilities to perform behaviors required to produce an outcome, (i.e., their self-efficacy) determine

in part whether the behaviors will be executed (Bandura, 1986). Individuals with high self-efficacy, (i.e., who believe that they are competent to perform specific behaviors), are more likely to perform and sustain health behaviors than persons with low self-efficacy (Bandura, 1986). The latter tend to avoid tasks they feel exceed their capabilities (Bandura, 1986). Although no studies that focused on patients with constipation were found, there is much research that supports self-efficacy generally as an important predictor of whether a person will perform recommended health behaviors (see reviews by Berarducci & Lengacher, 1998; Keller, Fleury, Gregor-Holt, & Thompson ,1999). This has been demonstrated in following diets, exercise regimens, medication adherence, and in other contexts.
EVIDENCE: Expert opinion and non-experimental studies.

RECOMMENDATION: Interventions are needed to enhance patients' self-efficacy. This is especially important for patients with low self-efficacy, when some discomfort is associated with performing a health behavior, or when a lifestyle change is needed. Some ways to enhance a person's self-efficacy are: (1) Ensure that the patient is successful in performing the activities by providing opportunities to practice the behaviors until they are mastered. (2) Provide patients the opportunity to observe others successfully performing the health behaviors. This may be further enhanced by providing patients with criteria for evaluating such performances, or by the nurse identifying the strengths and weaknesses of the behaviors. (3) Discuss with patients their positive qualities or capabilities that contribute to the likelihood of successful performance. Such appraisals of the patient's capabilities, however, must be realistic. (4) Provide patients with stress management strategies to prevent or reduce fear and anxiety associated with the performance of difficult behaviors.
RATIONALE: Enhancement of self-efficacy increases the likelihood that persons will expend effort in the performance of a task and persist at the task in the face of obstacles (Bandura, 1986). Studies of the effect of programs to enhance self-efficacy, although they have varied in the types of interventions administered, have shown that they can increase performance of health behaviors (see review Berarducci & Lengacher, 1998; Keller et al., 1999).
EVIDENCE: Expert opinion, nonexperimental studies

Other Treatments

Biofeedback. Biofeedback techniques are beneficial with patients with pelvic floor dysfunction; they are directed at reeducating the muscles of the pelvic floor to relax during defecation. Biofeedback is more likely to be successful when it is supplemented with dietary changes, behavioral modification, and physical therapy (Locke et al, 2000a; Prather & Ortiz-Camacho, 1998). Biofeedback has been found most useful in patients with external anal sphincter disorders. Klauser and Miller found this form of treatment to be successful in 54% of their patients.

Surgical treatment. Surgical treatment for constipation is usually reserved for severe intractable disease resulting from slow transit (Pemberton, Rath, & Ilstrup, 1991; Preston, Hawley, Lennard-Jones, & Todd, 1984). The most common procedure is abdominal colectomy with ileorectostomy (Prather & Ortiz-Camacho, 1998). However this procedure, although

increasing the frequency of defecation, is not always successful in alleviating the accompanying symptoms of constipation (Mollen, Kuijpers, & Claassen, 2001).

Patient education. The following material discusses six areas of concern that should be included in any patient education program.

Variations as to bowel routines: When completing health histories, it is important to instruct patients about the wide range of normal bowel routines (3xdaily to 3xweekly). Patients should be told about abnormal symptoms related to bowel evacuation, such as straining and fecal staining. Teaching the relationship of diet to bowel evacuation is important. Patients may expect daily bowel movements as being normal despite dietary intake and individual patterns. Patients may assume that they will have normal daily bowel movements regardless of their dietary habits or individual patterns of toileting. It is especially important to inform patients that after a general bowel cleansing, it will take at least 48 hours to build enough fecal content to have another bowel movement.

Safe and correct use of pharmaceutical agents: This information should include not only the side effects of prescribed medications, but also the long-term effects of chronic laxative use.

Role of toileting habits in maintaining adequate bowel habits: The importance of responding to the urge to defecate and establishing a daily pattern should be stressed as well as the importance of privacy and allowing time for daily evacuation.

Dietary considerations: The importance of a well-balanced diet, the role of dietary fiber and fluid in maintaining bowel function should be addressed. Encourage the inclusion of at least 1 liter of fluid daily, if such intake not restricted. Provide patient with information as to sources of dietary fiber.

Role of exercise and activity: Provide patients with information as to the role of exercise and activity in maintaining health and well-being.

Change in bowel habits: Significant or prolonged change in regular bowel habits should be reported to the person's primary care provider.

Patient Education Information Available Online

The American Gastroenterological Association
http://www.gastro.org/public/constipation.org

Iowa health book: Internal Medicine: Virtual Hospital: Constipation: A guide for patients
http://www.vh.org/Patients/IHB/IntMed/Gastro/Constipation.html

National Cancer Institute: Constipation, impaction, and bowel obstruction
www.cancer.org

Mayo Clinic nutrition tips for managing constipation
www.Mayoclinic.com

National Digestive Disease Information Clearinghouse.Constipation
http://www.niddk.nih.gov/health/dist/pubs

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Appendix A: Predisposing Factors for Constipation

Lifestyle
Immobility
Lack of exercise
Poor dietary and fluid intake
Changes in life routine, i.e. pregnancy, travel
- Ignoring the urge to defecate
- Stress
- Drinking alcohol
- Toileting Patterns
- Abnormal toileting position
- Inconsistent and insufficient toileting time
- Inadequate toileting facilities
- Lack of privacy

Iatrogenic
Polypharmacy
Drug induced
- Analgesics (narcotic)
- Antiemetics
- Antiparkinsons
- Antacids with aluminum and calcium
- Anticonvulsants
- Antihistamines
- Antidepressants
- Anticholinergics
- Aspirin
- Calcium channel blockers
- Diuretics (potassium wasting)
- Iron supplements
- Muscle relaxants
- Nonsteroidal anti-inflammatory drugs
- Psychotherapeutic
- Vinca alkaloids
- Abuse of laxatives

Secondary
Pathological
- Intra abdominal/pelvic diseases
- Spinal cord dysfunction
- Cauda equina syndrome

Psychological
- Depression

Metabolic
- Hypokalemia
- Hypothyroidism
- Hypercalcemia
- Diabetes, uremia

Anorectal disorders
- Anal fissures/abscess
- Anal stenosis
- Anterior mucosal prolapse
- Rectocele
- Tumors
- Perianal abscess
- Hemorrhoids
- Proctitis

Colonic
- Irritable Bowel Syndrome
- Diverticulosis
- Tumors
- Strictures
- Diverticulitis
- Ulcerative colitis
- Ischemic colitis
- Amoebiasis
- Lymphogranulomas venereum
- Endometriosis
- Hernias
- Volvulus
- Intussusception
- Idiopathic slow transit
- Pneumotosis cystoides intestinalis

Pelvic
- Pregnancy
- Ovarian tumors

Neuromuscular
- Hirschsprung's disease
- Autonomic neuropathy
- Chagas disease
- Intestinal pseudo obstruction
- Cerebral tumors
- Meningoceles
- Tabes dorsalis
- Shy-Dragar syndrome
- Dermotomyositis
- Progressive systemic sclerosis
- Diabetic neuropathy
- Parkinson's Disease
- Spinal cord injury
- CVA
- MS
- Spinal cord tumors
- Rectal dyschezia
- COPD (weakened diaphragm)

Systemic Disorders
- Amyloidosis
- Lupus
- Scleroderma

Appendix B: Constipation Assessment Scale*

Constipation Assessment Scale

	No Problem	Some Problem	Severe Problem
1. Abdominal distention or bloating			
2. Change in amount of gas passed rectally			
3. Less frequent bowel movements			
4. Oozing liquid stool			
5. Rectal fullness or pressure			
6. Rectal pain with bowel movement			
7. Small volume of stool			
8. Unable to pass stool			

**McMillan & Williams, 1989*

Appendix C: Content of Selected Fiber-rich Foods

Food Item	Fiber, grams
Artichoke, Fresh, 1 medium	6.4
Baked Potato with skin, 1	5.0
Brussels Sprouts, 1/2 c.	3.2
Pumpkin, canned, 1/2 c.	3.5
Avocado, 1/2	3.8
Blackberries, frozen, 1/2 c.	4.9
Blackberries/raspberries, raw, 1/2 c.	4.0
Dates, dried, 3	4.3
Figs, dried,3	4 9
Pear, bartlett, fresh, unpeeled	4.6
Prunes, cooked, 1 /4 c.	4.0
40% Bran flakes, 3/4 c.	5.5
100% Bran Cereal, 1/3 c.	8.1
Wheaties	3.2
Barley, 1/2 c.	7.0
Bran muffin	4.0
Oat bran cereal, uncooked, 1/3 c.	5.3
Wheat germ, 1/4 c.	3.9
Baked beans, 1/2 c.	5.5
Beans, great northern, dry, cooked, 1/2 c.	8.2
Beans, lima, dry, cooked, 1/2 c.	8.0
Beans, kidney, canned, 1/2 c.	3.4
Lentils or peas, cooked, 1/2 c.	5.0
Ralston Purina Bold & Zesty Chex Snack, 1/2 c.	5.0
Trail Mix, 1/2 c.	3.8
Trail Mix, Tropical, 1/2 c.	4.5
Whole Wheat Soft Pretzel, Auntie Anne's	8.0
Wheat Snacks, Spicer, 1/2 c.	6.0
Food Supplements and Enteral Feedings	
Ensure drink with fiber, 1 c.	3.0
Nutra Shake with fiber, 1 c.	5.3
Slim Fast Ultra Drink, 1 c. (chocolate, mocha)	5.0
Slim Fast Ultra Drink, 1 c. (vanilla)	4.0
Slim Fast Ultra Drink, 1 c. (fruit with orange juice)	6.0
Sweet Success Drink, chocolate flavors, 1 oz dry mix prepared with skim milk	6.0
Sweet Success Drink, other flavors	4.8-5.3
Power Bar	3.0
Sweet Success Bar (except chocolate raspberry)	3.0

References

Hands, E.S. (2000). *Nutrients in Food,* Philadelphia: Lippincott Williams & Wilkens.

Marlett, J.A., & Cheung, T. (1997). Database and quick methods of assessing typical dietary fiber intakes using data for 228 commonly consumed foods. *Journal of the American Dietetic Association,* 97, 1139-1151.

Appendix D: Tips for Increasing Fiber in the Diet

- Consume fiber-rich legumes as the primary source of protein in a meal at least once or twice a week.
- Consume at least five fruits and vegetables each day.
- Incorporate 2-3 servings of whole grains as part of the 6-11 recommended servings in the Food Guide Pyramid.
- Vary and complement whole grains, nuts and seeds, legumes and fruits and vegetables to obtain all fiber components in the diet.
- Choose high fiber cereals and snacks that identify whole grains on the label as one of the first ingredients.
- Select whole fresh and dried fruits rather than fruit juices.
- Read food labels to determine fiber content based on % Daily Value of a 2000 calorie diet (15 grams/1000 calories).

Note: Remember to exercise regularly and increase fiber gradually over several weeks along with plenty of noncaffeinated, nonalcoholic fluid (8 glasses).

Appendix E: Types of Fiber

Insoluble in Water	Water Soluble
Cellulose, lignin and some hemicellulose	Mainly pectin, gums, mucilages and some hemicellulose
Grains	
Brown Rice	Barley
Corn Bran	Oat Bran, Oatmeal
Whole Wheat Breads	Psyllium
Wheat Bran Cereals	Soybean Fibers
Nuts/Seeds	
Almonds	Peanuts
Sesame Seeds	Pecans
Sunflower Seeds	Walnuts
Fruits/Vegetables	
Apples	Apples
Bananas	Asparagus
Berries	Broccoli
Broccoli	Brussel Sprouts
Cherries	Carrots
Green Peppers	Cranberries
Pears	Grapefruit
Red Cabbage	Mango
Spinach	Oranges
Sprouts	

Source: Adapted from Insel, P.,Turner, R.E., & Ross, D. (2001). *Nutrition* (p. 104). Sudbury, MA: Jones Bartlett Publishers.

Appendix F: Insoluble, Soluble and Total Dietary Fiber

Formula	Manufacturer	Fiber Source	TDF (g/L)	Insoluble (g/L)	Soluble (g/L)
*Advera	Ross	Soy polysaccharide	8.9	8.4	0.5
Compleat Modified	Sandoz	Fruits and vegetables	4.2	3.0	1.2
Compleat Regular	Sandoz	Fruits and vegetables	4.2	3.0	1.2
Diabetisource	Sandoz	Fruits and vegetables	4.2	3.0	1.2
*Ensure with fiber	Ross	Soy fiber	14.4	13.5	0.9
Fibersource	Sandoz	Soy polysaccharide	10.0	9.4	0.6
Fibersource HN	Sandoz	Soy polysaccharide	6.7	6.3	0.4
*Glucerna	Ross	Soy fiber	14.4	13.5	0.9
Glytrol	Clintec	Gum arabic, pectin, soy polysaccharide	15.0	5.0	10.0
Impact with Fiber	Sandoz	Soy polysaccharide, partially hydrolyzed guar gum	10.0	5.0	5.0
Isosource HN	Sandoz	Soy polysaccharide, partially hydrolyzed guar gum	10.0	4.8	5.2
*Jevity	Ross	Soy fiber	14.4	13.5	0.9
*Kindercal	Mead Johnson	Soy fiber	6.2	6.0	0.2
Nutren 1.0 with fiber	Clintec	Soy polysaccharide	14.0	13.3	.07
*Pediasure with fiber	Ross	Soy fiber	5.0	4.7	0.3
ProBalance	Clintec	Soy polysaccharide, gum arabic	10.0	7.5	2.5
*Promote with fiber	Ross	Oat & soy fiber	14.4	13.5	0.9
*Protain XL	Mead Johnson	Soy fiber	8.0	7.5	0.5
Replete with Fiber	Clintec	Soy polysaccharide	14.0	13.3	0.7
*Sustacal with Fiber	Mead Johnson	Soy fiber, acacia fiber, microcrystalline cellulose	10.6	7.4	3.2
*Ultracal	Mead Johnson	Oat and soy fiber	14.4	13.7	0.7

*Values for insoluble and soluble fiber for the following formulas were calculated from the percentages provided by the manufacturer:
Advera, Ensure with fiber, Glucerna, Jevity, Pediasure with fiber—94% insoluble and 6% soluble
Ultracal, Kindercal—95% insoluble and 5% soluble
Sustacal with fiber—70% insoluble and 30% soluble
Protain XL—94% insoluble and 6% soluble

Reprinted from Trujillo, E.B. (1998). Enteral nutrition: A comprehensive overview. In L.E. Matarese, & M.M.Gottschlich (Eds.), *Contemporary Nutrition Support Practice* (p. 197). Philadelphia: W.B. Saunders Company, ©1998, with permission from Elsevier Science.

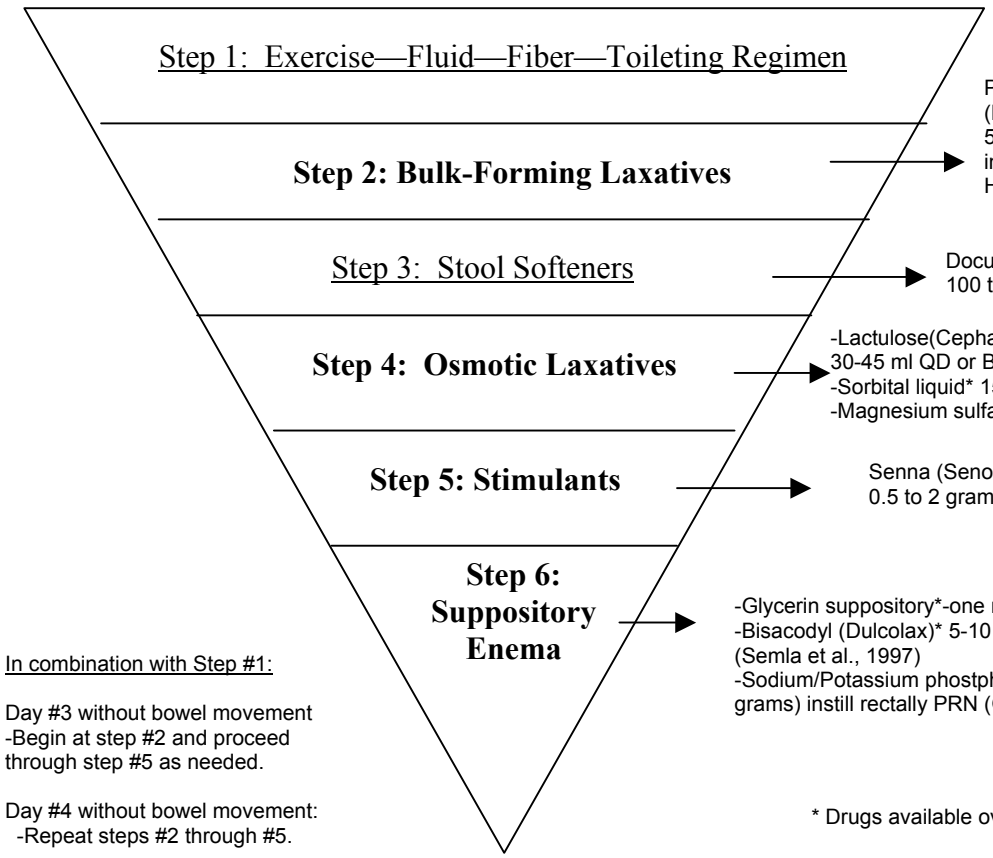
Appendix G: Classification of Laxative Therapies

Class	Examples	Site of Action	Mechanism of Action
Osmotic	Magnesium hydroxide (saline osmotic) Lactulose Sorbitol	Small and large intestine	Attract/retain water in intestinal lumen increasing intraluminal pressure
Irritant or peristaltic stimulant	Senna Bisacodyl Danthron Cascara	Colon	Has a direct action on mucosa, stimulates myenteric plexus, and alters water and electrolyte secretion
Bulk or hydrophilic	Plantain derivatives Methylcellulose Psyllium Ispaghula Dietary bran Celandrin Alovera	Small and large intestine	Holds water in stool and mechanical distension
Surfactant or softener or wetting agents	Docusate Poloxalkol	Small and large intestine	Softens stool by facilitating admixture of fat and water to soften stool

Tramonte, S.M., Brand, M. B., Mulrow, C.D., Amato, M.G., O'Keefe, M.E., & Ramirez, G. (1997). The treatment of chronic constipation in adults. A systematic review. *Journal of General Internal Medicine, 12*(1), p. 17. Adapted with permission of contact author, C.D. Mulrow.

Appendix H: Stepwise Approach to Management of Constipation

(Adapted from Sanburg, McGuire, & Lee, 1996*)



Specific Treatment

Psyllium hydrophyllic muculoid (Metamucil)*
5-11 grams (1-2 tsp.) QD to TID in 8 oz. Fluid (Semla, Beizer, & Higbee, 1997)

Docusate sodium (Colace)*
100 to 400 mg daily (Semla et al., 1997)

-Lactulose(Cephalac) 70% liquid solution 30-45 ml QD or BID (Semla et al., 1997)
-Sorbital liquid* 15 ml TID, then QD (Sanburg, et al., 1996)
-Magnesium sulfate* 10-30mg QD(Semla et al., 1997)

Senna (Senokot)*
0.5 to 2 grams QD or BID (Davis, 1991)

-Glycerin suppository*-one rectally PRN (Semla et al., 1997)
-Bisacodyl (Dulcolax)* 5-10 mg suppository-one rectally PRN (Semla et al., 1997)
-Sodium/Potassium phostphate enema (Fleets)* 133 ml (21.3 grams) instill rectally PRN (Gibson et al., 1995)

* Drugs available over the counter.

In combination with Step #1:

Day #3 without bowel movement
-Begin at step #2 and proceed through step #5 as needed.

Day #4 without bowel movement:
-Repeat steps #2 through #5.

Day #5 without bowel movement:
-Go to step #6.

(Gibson, Opalka, Moore, Brady, & Mion, 1995)

*Sanburg, A.L., McGuire, T.M., & Lee, T. (1996). Stepping out of constipation: An educational campaign. *Australian Journal of Hospital Pharmacy*, 26, 350-355.