EVALUATION OF TWO ORAL ASSESSMENT TOOLS FOR USE BY STAFF NURSES IN THE HEMODIALYSIS UNIT

by

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CHAPTER I

INTRODUCTION

A growing number of patients are receiving hemodialysis and renal transplants as therapeutic interventions for chronic renal failure. It is estimated that by 1984 more than 55,000 patients in the United States will be receiving dialysis therapy for chronic renal failure, with more than 5200 likely to receive renal transplants (Cummings, 1978).

Infection remains the most common cause of death for this population (Maher & Golden, 1962). In addition, all possible sources of infection must be eradicated from dialysis patients before a transplant is considered.

The physiological alterations occurring in chronic renal failure contribute to the debilitated state of these patients and render them more susceptible to localized and systemic infections. Buller (1973) has identified the oral cavity as a potential portal of entry for microorganisms. Periodontal disease predisposes the dialysis patient to systemic bacterial invasion and the incidence of bacteremia has been correlated with the degree of periodontal disease (Elliott, 1939; Conner, Haberman, & Collins, 1967; Lineberger & DeMarco, 1973).

Many patients receiving dialysis therapy have a condition of oral neglect. These patients may have the usual excuses for neglecting routine dental care. In addition, it

has been estimated that an average of one to four units of transfused blood per month is required to supplement renal dialysis and maintain the hematocrit (Pendras & Erickson, 1966). These transfusions expose the dialysis patient to the possibility of homologous serum hepatitis. As the risk of serum hepatitis increases with the amount of blood transfused, it becomes apparent that dialysis patients are a potentially notable source of infection for the dentist and therefore, many dentists are reluctant to treat the dialysis patient (Kirkpatrick & Morton, 1971; Donaldson, 1972; Uthman, 1975).

Because the dialysis patient manifests oral cavity conditions predisposing them to infection it becomes essential that nurses routinely use a clinically valid assessment tool for oral cavity evaluation. Nurses are the health care professionals who are in a position of responsibility for recognition of these alterations in oral hygiene status. Unfortunately they are often without tools necessary for making this assessment, and usually if the assessment is done, it is in a haphazard manner. Although a few tools have been suggested for oral evaluation, none have been studied or developed sufficiently to verify that they can be used by nurses to detect the necessary changes in oral hygiene status.

The purpose of this study, therefore, is to evaluate the use of oral assessment tools by nurses in the hemodialysis unit.

Review of the Literature

In order to foster proper oral hygiene for renal dialysis patients, the nurse must have a thorough understanding of the pathophysiology of renal failure, as well as the anatomy and physiology of the oral cavity. The literature review will include a description of specific oral hygiene problems related to the hemodialysis patient population. Alterations in the blood urea level, serum calcium-phosphate product and the blood hematocrit will be discussed. Factors which affect the oral cavity will also be included, such as the mechanisms for maintaining oral health, dehydration, and the pathway by which peridontal disease can lead to systemic bacterial invasion. Assessment tools which can be presently found in the literature will also be examined.

The Chronic Hemodialysis Patient

The debilitated condition of the hemodialysis patient makes this patient population a high risk for infection (Maher & Golden, 1962). The oral cavity is often the primary site of this infection and provides the portal of entry for localized and systemic infection (Buller, 1973). Numerous alterations occur in the oral cavity of the dialysis patient and it is essential that these signs be recognized by nurses in order for appropriate interventions to be employed. Intervention during the early stages may prevent further breakdown of tissue or complications from occurring. For the renal dialysis patient

these measures may be life saving. Alterations in the blood urea level, serum calcium-phosphate product and the blood hematocrit are manifested in the oral cavity of the dialysis patient. These alterations are discussed in more detail below.

Uremic patients frequently complain of a metallic or salty taste in their mouths, altered taste, and the odor of ammonia on their breath (Epstein, 1970; Merrill & Hampers, 1971; Price & Wilson, 1978). It has been suggested that each of these signs and symptoms is related to an elevated level of blood urea due to the uremic process (Merrill & Hampers, 1971). The decomposition of this elevated concentration of urea by the enzyme urease found in dental calculus and normal oral bacteria, hydrolyzes salivary urea resulting in the liberation of ammonia and a resultant irritation of the oral mucosa (Merrill & Hampers, 1971). Inflammation and breakdown of the oral mucosa may rapidly lead to oral cavity ulceration and stomatitis (Larato, 1975). As inflammation progresses, parotitis may also occur (Price & Wilson, 1978). As early as 1957, Burket described the oral complications of uremia:

> A marked uriniferous odor is characteristic of these patients even in the absence of oral lesions. The oral mucosa . . . has a dry, pasty, yellowish appearance. Shallow red-rimmed ulcers of the oral mucosa and the tongue margins, which develop first at the site of local irritation or trauma, are common. The lesions become covered with a yellowish or a whitish colored material.

In addition to the alteration in blood urea, an altered serum calcium-phosphate product has been discussed in the

literature (Merrill & Hampers, 1971; Westbrook, 1978). It is believed that this alteration in the serum calcium-phosphate product results in deposits of dental calculus forming at an accelerated rate. This imbalance has also resulted in metastatic calcifications in the lungs, heart, joints, kidneys and blood vessels. As calculus builds in the oral cavity, an inflammatory reaction begins to destroy alveolar bone and peridontium resulting in pocket formation around the teeth. These pockets provide an optimal area for systemic bacterial invasion.

The third classic oral manifestation found in patients receiving hemodialysis is pallor of the oral mucosa (Merrill & Hampers, 1971; Westbrook 1978). This mucosal pallor is a reflection of the anemic condition of many of these patients whose hematocrits are maintained between 15% to 25%. A normal population laboratory value would range between 37% to 47% (Wallach, 1978).

The anemia of renal failure is normochromic and normocytic, and is primarily attributed to deficient or absent production of erythropoietin by the kidneys (Merrill & Hampers, 1965; Nosé, 1969; Epstein, 1970; Price & Wilson, 1978). Abnormal red blood cells, known as Burr cells, have a shortened life span which contributes to the anemia. These abnormal red blood cells are felt to be related to the altered chemical environment within the plasma (Merrill & Hampers, 1965). A quantitative and qualitative defect in platelets found in the uremic

patient may also result in mucous membrane bleeding or gastrointestinal bleeding. Gastrointestinal bleeding would further reduce the hematocrit (Epstein, 1970).

Anemia leaves the patient in a weakened and debilitated state. The debilitated state of the dialysis patient makes them much more susceptible to infection.

Because the dialysis patient manifests oral cavity conditions predisposing them to infection it becomes essential that nurses routinely use a clinically valid assessment tool for oral cavity evaluation. Nurses are the health care professionals who are in a position of responsibility for recognizing these alterations in oral hygiene status. Unfortunately they are often without the tools necessary for making this assessment, and if the assessment is done, it is usually done in a haphazard manner. Although a few tools have been suggested for evaluating the oral cavity, none have been studied or developed sufficiently to verify that they can be used by nurses to detect the necessary changes in oral hygiene status. The evaluation and utilization of an oral assessment tool or tools in the dialysis unit is urgently needed.

A study completed by Uthman in 1974, further emphasizes the need for frequent and adequate oral assessment. Uthman (1974) evaluated 8 renal and 8 non-renal patients for general oral health. Plaque, gingival, calculus and gingival sulcus indices were recorded on each patient prior to and following a scaling treatment. Two weeks following the appointment for

their teeth to be scaled, the above measures were repeated. Of the non-renal patients, 62% showed a decrease in gingival inflammation following the scaling treatment. Only 25% of the renal patients showed improvement. Subjective findings from the renal patients included complaints of a dry mouth and metallic taste prior to each treatment. Their oral mucosa was pale and attributed to chronic aremia. Uthman concluded that renal patients showed a delay in healing and tissue repair after routine scaling when compared to non-renal patients. The delayed healing following a routine dental procedure emphasizes how essential it is that the dialysis patient receives an effective oral assessment by nurses. Early nursing detection of an infection which may be secondary to the delayed healing will facilitate prompt correction.

Conditions Affecting the Oral Cavity

Physiologically, oral health is primarily maintained by the movement of saliva around the mouth by the tongue, lips and cheeks during chewing, swallowing and speech. The natural detergent action of some foods also promotes a healthy oral cavity.

The mechanisms of chewing and swallowing cleanse the teeth and remove food particles from the oral cavity. Guyton (1977) states that saliva lubricates the food bolus, moistens the oral mucosa, and washes away food debris and pathogenic microorganisms. An adequate diet also promotes oral health.

The texture of hard fibrous foods aids the cleansing action in the oral cavity. On the other hand, breathing by mouth and administration of oxygen are accompanied by decreased salivary flow.

Because dialysis patients are more susceptible to infection, a healthy oral cavity and an adequate salivary flow are necessary to maintain oral health. Salivary flow, the cleansing action of foods, and the muscles of mastication help reduce oral cavity microorganisms that may cause infection in dialysis patients.

A reduced or absent salivary flow is detrimental to all hospitalized patients, but especially to the dialysis patient in his debilitated state. MacLennon (1974) notes that dentures, drugs and restricted oral fluid intake can diminish the saliva flow of any member of the patient population. Maurer (1977) states that when saliva flow is diminished, food debris remains in the oral cavity and acts as a growth medium for microorganisms.

Nausea, vomiting, diarrhea, and fluid restriction may each decrease the salivary flow of dialysis patients. When oral cavity ulcers result due to the decreased salivary flow, they serve as a direct route for bacterial invasion of the bloodstream. The infection thus caused may accentuate the catabolic process and impair adequate nutrition and fluid intake. This process, in turn, leads to further dehydration.

The etiology of the nausea, vomiting and diarrhea in

uremia remains unclear. It has been suggested that the decomposition of urea by normal gastrointestinal flora may result in the liberation of ammonia and subsequent irritation of the gastrointestinal mucosa (Merril & Hampers, 1971). Nausea, vomiting and diarrhea can each lead to a rapid gastrointestinal loss of fluid and electrolytes with resultant dehydration.

In addition, the diet of the renal dialysis patient is carefully regulated. They are generally restricted in their sodium, potassium and protein intake (Merril & Hampers, 1971). Protein intake must be reduced in uremia due to the inability to excrete the nitrogenous end products of protein metabolism. Because of these dietary restrictions dialysis patients are encouraged to eat fats and sugars in order to maintain an adequate calorific intake. The intake of fat which can be tolerated in the diet is limited and these patients resort to eating large quantities of sugar. This diet is detrimental to the oral cavity for two reasons. The high sugar content in the diet predisposes these patients to dental caries and a low protein diet impairs oral tissue healing.

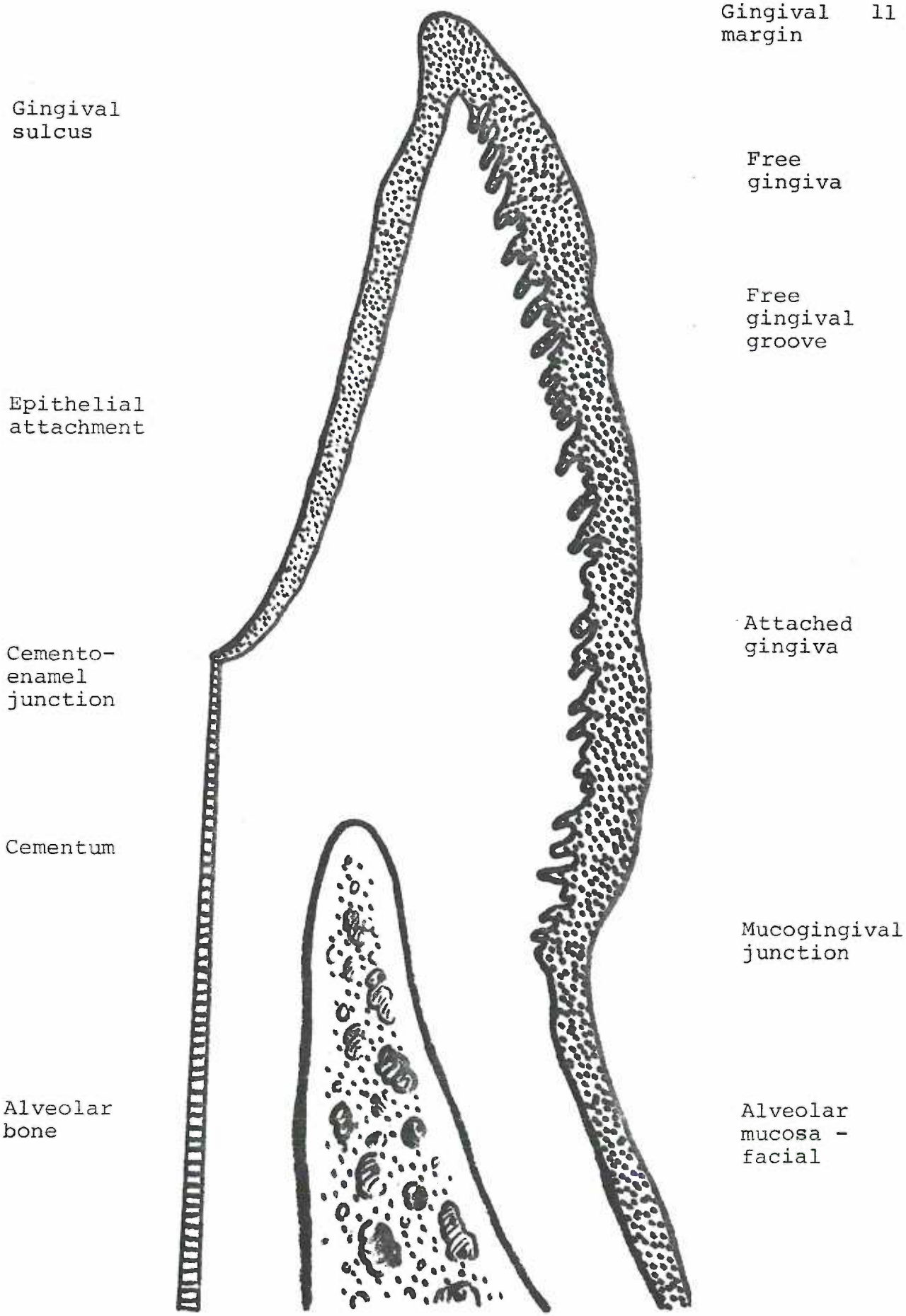
Dialysis patients are frequently on a restricted fluid intake as well. Although increasing fluid intake would encourage salivation, this procedure is contraindicated in patients with renal failure.

Manipulation of the oral structures may induce a transient bacteremia and prove fatal for a patient undergoing chronic

hemodialysis (Buller, 1973). Manipulation may include such common practices as oral hygiene nursing care and mastication. In order to adequately understand the pathway followed in developing systemic disease, a knowledge of the normal anatomy of the tooth and gum is essential (see Figure 1). Buller (1973) states that the gingival sulcus appears to be the pathway that transient bacteremias of oral origin follow.

Peridontal disease predisposes the hemodialysis patient to systemic bacterial invasion. Peridontal disease is primarily caused by three agents: bacteria, calculus, and food debris (Schreiber, 1964; Levine & Grayson; Dyer, Monson & Cope, 1976). The most destructive agent is bacterial plaque, which is a white, mucoid material derived from the bacterial breakdown of saliva (Shafer, 1963). Plaque and calculus deposits on the teeth have been associated with the occurrence and the intensity of periodontal disease (Ash, Gatlin & Smith, 1964; Shapiro, Pollack & Gallant, 1971). When the oral cavity is not properly cleansed, the plaque hardens within 2-14 days after its formation (Dyer, Monson & Cope, 1976). As the calculus builds unchecked, the inflammatory reaction spreads progressively deeper into the peridontium and alveolar bone. Destruction of the alveolar bone and peridontium predisposes to pocket formation around the teeth. As these pockets become receptacles for food and debris, the process is accelerated (Levine & Grayson, 1973).

A hemodialysis patient whose peridontal pockets are filled


Enamel
Gingival margin
Gingival sulcus
Free gingiva
Free gingival groove
Epithelial attachment
Attached gingiva
Cemento-enamel junction
Cementum
Mucogingival junction
Alveolar bone
Alveolar mucosa - facial

with putrified debris introduces bacteria into his bloodstream every time oral manipulation occurs because it causes damage to the capillaries in the inflamed tissues around the pockets (Buller, 1973). Bacteremia can potentially form abscesses in other, distant, parts of the body.

The threat of infection arising from the oral cavity is great in dialyzed patients and infection is cited as the most common cause of death for these patients (Maher & Golden, 1962). Furthermore, oral cavity infection renders the dialysis patient ineligible for renal transplantation. Thus, nursing personnel must maintain adequate oral health in the dialysis patient population. An accurate and efficient measuring instrument must be utilized by nurses to assess the oral cavity and on which to base nursing judgment regarding appropriate methods, agents, and the frequency for oral hygiene nursing care.

Assessment of Oral Health Status

Dentists and nurses alike have defined the oral hygiene assessment care of the hospitalized patient to be a nursing responsibility (Ginsberg & Yoder, 1964; Schreiber, 1964; Passos & Brand, 1966; Levine, 1973; Loveloch, 1973; MacLennon, 1974; DeWalt, 1975). Mauer (1977) states that oral hygiene nursing care must be based on a knowledge of oral physiology and how it is altered by various disease states, an assessment of the patient's oral condition, characteristics of the agents

and materials available for use, and the methods for effecting care based on the total situation. Passos & Brand (1966) and DeWalt (1975) further emphasize the necessity for adequate nursing assessment of the patient's oral cavity prior to implementing a plan of care. According to Pope and Reitz (1975),

> Unless the nurse specifically inspects the mouth, problems can be overlooked rather than treated or prevented. The routine inspection of the mouth should be a vital part of the daily observation of each client.

Gingival changes can occur rapidly, even within minutes (Ginsberg, 1961; DeWalt & Haines, 1969; VanDrimmelen & Rollins, 1969; Reitz & Pope, 1973). These rapid gingival changes have been noted with oral breathing, continuous flow nasal oxygen, intermittent mechanical suctioning and when no food or fluid intake is allowed per mouth. Oral nursing assessment is imperative in evaluating the rapidly changing condition of the oral cavity in hospitalized patients. Renal dialysis patients are at particular risk for infection as a result of oral cavity inflammation and disease. Oral evaluation of 1634 patients in one hospital demonstrated that 80% of these patients had some form of oral disease that required treatment. The majority of these patients were not aware they had oral hygiene problems (CHDS, 1966). Thus, even though the dialysis patient population frequently is alert and capable of caring for their own mouths, it remains a nursing responsibility to assess the condition of their oral cavity and suggest

appropriate measures for them to utilize in maintaining oral health.

Assessment of oral status must take into account more than the oral cavity. The nurse must also be aware of physical stressors predisposing to oral cavity disease such as a decreased level of consciousness, oxygen administration, inadequate diet, abnormal jaw movements, decreased salivary flow and a diminished ability for self care.

The assessment tool utilized to evaluate the oral health of a patient must state concisely the areas to be evaluated and the descriptive criteria to be used to quantify the changes from normalcy to deterioration which may occur as a result of inadequate oral care (Maurer, 1977). Polit (1978) described the ideal measuring tool as "one which results in measures that are relevant, accurate, objective, sensitive, unidimensional and efficient." The criteria should be sufficiently sensitive to allow for evaluation of the effectiveness of oral hygienic measures which are implemented. The tool to be used by nurses must also allow for detection of even minor changes in the oral condition, even those which may occur in one day.

A review of the literature indicates that several rating scales exist that describe the various conditions of the mouth as the oral cavity progresses from a healthy to a compromised state (Passos & Brand, 1966; Van Drimmelen & Rollins, 1969; Bruya & Madeira, 1975; DeWalt, 1975; Maurer, 1977). DeWalt

(1975), Maurer (1977) and Van Drimmelen and Rollins (1969) merely assess the oral cavity, with no rating scale being given for evaluating the patient's physical condition, specifically regarding level of consciousness, breathing habits, nutritional habits, jaw movements, and self care ability. Bruya and Madeira (1975) adapted a physical status scale from one written by Passos and Brand (1966) and more preceisely defined these areas. The Bruya/Madeira tool appears to be an ideal measuring tool in that it encompasses those areas which are relevant when evaluating both the oral and physical status of hospitalized patients.

The assessment tool utilized by nurses for evaluating the oral cavity must examine those areas of the oral cavity deemed essential by the dental profession. Ross, Johnson, and Hayes (1967) describe those areas of the oral cavity which need to be evaluated in the course of a dental examination. The lips and tongue must be inspected for color, texture, ulcers, and cracks; the gingiva for inflammation, ulceration, and bleeding; and the mucous membrane of the soft palate, uvula and tonsilar fossa must also be inspected. In addition to the objective tools which are frequently used by the dental profession for visual examination, a specific plaque scoring index is often utilized. O'Leary's Plaque Control Record is an oral hygiene index used to evaluate the plaque found on the tooth surfaces.

The nursing profession needs an oral assessment tool, or

tools, which can be utilized for the dialysis patient population. These tools must concisely measure the important areas within the oral cavity which are altered by the uremic state, evaluate the physical status of patients as related to oral health, and assess those areas deemed essential in an oral examination by the dental profession. In addition, the tool must be feasible for use by staff nurses with regard to the time necessary to learn to use the tools and the subsequent practicality of their use. The Bruya-Madeira Guide to Assessment of the Mouth and the O'Leary Plaque Control Record appear to meet the requirements stated in the literature.

Summary

Dialysis patients are at risk due to the potential infections that might arise from the oral cavity. This is because infection remains the most common cause of death in this patient population (Maher & Golden, 1962). In addition, infection renders the dialysis patient ineligible for kidney transplantation. Nurses are responsible for assessing the condition of the oral cavity and implementing a plan of oral hygiene care based on that assessment. The Bruya-Madeira Guide for Assessment of the Mouth and the O'Leary Plaque Control Record appear to evaluate the essential areas of the oral cavity, as well as the corresponding physical status. In addition to being useful for evaluating the dialysis patient's oral status, these tools

appear to be feasible for use by staff nurses. The nursing oral assessment tools currently found in the literature do not appear to have been evaluated for validity and reliability.

Dialysis patients provide an optimum population on which to test these assessment tools. These patients are at maximum risk for oral infection and would benefit greatly by nursing assessment with subsequent oral hygiene nursing care based on the evaluation. In addition, the dialysis patient population has a wide variation in oral pathology by which to test the sensitivity of the tool for varying oral cavity conditions.

Purpose of the Study

This study had two purposes. The first purpose of this study was to compare a known and widely used oral assessment tool, the O'Leary Plaque Control Record, with a written but not tested assessment tool, the Bruya-Madeira Guide for Assessment of the Mouth, in the hemodialysis unit.

The second purpose of this study was to determine whether these two tools would be feasible for use by staff nurses in the hemodialysis unit, as measured by the length of time needed to instruct the staff nurses on how to utilize the tools and also by recording the amount of time it took to utilize the tools for actual patient evaluation. Additional information was obtained by a self report questionnaire completed by the staff nurses regarding feasibility of the tools (Appendix C).

CHAPTER II

METHODS

Introduction

This study was a clinical investigation to identify an effective method of assessing the oral cavity which could be utilized by nurses in a hemodialysis unit of a 528-bed federal government health care facility. Two tools were chosen to be studied. The investigator and two staff nurses from the dialysis unit collected data on the oral cavity conditions of 16 hemodialysis patients who were eligible for participation in this study. This data was evaluated to determine if either of the two tools being utilized alone, or when used together, would provide the information necessary in maintaining oral health or in implementing a plan of care for those patients found to have a pathological oral cavity condition requiring nursing or dental intervention. In addition, the feasibility of using these tools as a method for ongoing nursing oral assessment was examined through the use of a questionnaire completed by the two staff nurses participating in this study. The time needed to instruct the two nurses to utilize the tools adequately and the time required to acutally use the tools for oral assessment was also recorded.

Subjects and Setting

Subjects were selected from the hemodialysis unit at a 528-bed federal government health care facility during the month of March, 1980. The facility is affiliated with a health sciences center and is a teaching hospital. A full range of services are available to the patients, including dental, dietary, x-ray, laboratory, inhalation therapy, and rehabilitative services. Frequently the physician in charge of the dialysis patients will enlist the aid of medical or surgical specialists in the treatment of these patients.

The majority of patients receiving hemodialysis require approximately three 6-hour inpatient treatment sessions a week. Between hemodialysis sessions most patients function as outpatients. A small number of patients being dialyzed in the hemodialysis unit are patients on a home dialysis program. These patients are being instructed on the technique of home dialysis, while other home patients are being seen in the unit for a periodic evaluation of their general health status related to their home dialysis program. During the month of March, 26 patients were available in the hemodialysis unit for study. The turnover rate of patients from one month to the next is low, and depends primarily on available kidneys, patient death, and the number of patients able to be placed on a home dialysis program.

Subjects were eligible for participation in this study if they met the following criteria:

1. Received hemodialysis therapy at the government facility during the month of March, 1980.

2. Gave informed consent prior to the intiation of any oral examination.

3. Were adults, eighteen years of age or older.

4. Possessed four or more of their own teeth.

5. Did not have active hepatitis.

Of the 26 patients available for this study, 16 patients were actually evaluated. Only one patient refused and the remaining 9 patients had no teeth of their own and thus were ineligible for the study. Neither the O'Leary Plaque Control Record or the Bruya-Madeira Guide for Assessment of the Mouth can be utilized on patients having no teeth.

The dialysis unit is staffed by eight registered nurses, including the head nurse, and one of these nurses works part-time. Of these 8 nurses, 7 are female and 1 is male. Two nurses have bachelor of science in nursing degrees, one has an associate degree in nursing, and the remaining five nurses possess diplomas in nursing. Six dialysis technicians are employed in the dialysis unit but are not considered as part of nursing service.

Prior to beginning the study, a scheduled inservice was held for all registered nurses working in the dialysis unit. All nurses were present at this meeting, and the investigator described the study and what volunteering to participate as a staff nurse would entail. Two nurses from the dialysis unit

chose to participate in the study. Criteria for nurse eligibility to participate in the study were that the nurse must be:

1. A registered nurse.
2. A willing participant in the study.
3. Available for instruction on the use of the tools.
4. Available during the month of March, 1980 for patient evaluation.

Both nurses volunteering for this study were female. Of these two nurses, one had a bachelor of science degree in nursing, and the other was a graduate of a diploma nursing school.

Instruments for Measurement of Oral Hygiene Status

Several oral hygiene tools have been reviewed in the literature which are of interest to nurses in evaluating the oral cavity (Passos & Brand; VanDrimmelen & Rollins, 1969; Maurer, 1971; Bruya & Madeira, 1975; DeWalt, 1975). The dental literature has an abundance of widely used tools which quantitatively assess various aspects of oral hygiene status (Greene & Vermillion, 1960; Greene & Vermillion, 1964; Loe, 1967; O'Leary, 1967; Podshadley & Haley, 1968; Grossman & Pedi, 1973). The tools chosen for this study to evaluate oral hygiene status appeared to be noninvasive and safe, feasible for use by nurses and valuable in quantifying oral changes which may be influenced by oral hygiene measures. Each tool appeared to be sufficiently sensitive to

detect changes in those areas it proposed to evaluate.

The O'Leary Plaque Control Record (1967, 1972) was developed to give the hygienist or dental educator a simple method of recording the presence of plaque on individual tooth surfaces (mesial, distal, facial, lingual). Although there is no data in the literature describing the reliability of this tool, it is a widely used tool within the dental profession. The O'Leary record was also highly recommended by two dental professionals on the faculty at the health sciences center dental school as best meeting the criteria for a tool to be utilized by nurses. To utilize the tool a disclosing tablet is chewed and swished in the mouth in order to cover all tooth surfaces. After the patient has swished the dissolved tablet in his mouth and rinsed the tablet from his mouth, the investigator examines each stained surface for soft accumulations at the dentogingival junction. When they are found, the accumulations are recorded by making a dash in appropriate spaces on the form. (A copy of the form appears in Appendix A). Each tooth is divided into four areas. After all the teeth are examined and scored, an index can be derived by dividing the number of plaque containing surfaces by the total number of available surfaces and myltiplying by 100. A score of greater than 10% has been deemed indicative of oral neglect and pathology by the author (O'Leary, 1972).

Nurses are also interested in other areas of the oral cavity and for this reason a nursing tool was chosen to be

utilized in conjunction with the plaque record. Nurse researchers identified the lips, tongue, mucous membrances of the palate, uvula, and tonsilar fossa, gingival tissue, teeth, saliva, taste and voice as important variables related to oral cavity condition. (Ginsberg & Yoder, 1964; Passos & Brand, 1966; DeWalt, 1975; Maurer, 1977). In addition, physical factors, such as level of consciousness, breathing habits, nutritional habits, chewing ability, and self care ability have been demonstrated to be important variables in maintaining the health of the oral cavity.

The Bruya-Madeira Oral Assessment Guide was chosen from other tools found in the nursing literature because it appeared to offer a more precise and thorough evaluation of the variables utilized by nurses for evaluating oral status. (A copy of this tool appears in Appendix B). In addition, this tool measures variables which are important concerns to dialysis patients, such as fluid intake and oral mucosal color. There are twelve variables in the oral assessment tool which reflect oral hygiene status: texture, color, and moisture of lips; texture, color, and moisture of tongue; mucous membranes of the palate, uvula, and tonsilar fossa; gingival tissue; teeth; saliva; taste and voice. These variables are measured according to the guide for numerical and descriptive ratings found in the oral assessment tool. Numerically, a score of 1 is considered to be a desirable oral condition and a score of 3 is the most undesirable or maximal score for a variable. When

the oral condition approaches normal, a numerical rating of 12 will be received and this is the optimal score. The worst score possible is 36.

Physical status is also measured by using 5 variables: level consciousness, breathing habits, nutritional habits, chewing ability, and self care ability. The physical measures are also evaluated according to the guide for numerical descriptive ratings found in the oral assessment tool. Numerically, a score of 1 is considered to be a desirable oral condition and a score of 3 is the most undesirable or maximal score for a variable. As the physical measures approach normal, a numerical rating of 5 will be received. A rating of 15 indicates the most deleterious physical condition. By including physical assessment as a part of the total evaluation, the nurse can compare the oral cavity condition to the patient's physical status and implement a more comprehensive plan for oral hygiene care in order to promote oral health.

For the purpose of this study the variables measuring oral condition and those measuring physical status were computed together. An optimal score would then be 17. A score of greater than 17 was determined to be indicative of oral neglect or pathology by this investigator. For example, a subject receiving a perfect score for physical status but obtaining a numerical score of 2 on the oral cavity measurement of gingival tissue and teeth would receive a total score

of 19. (See Appendix B)

Questionnaire Utilized by Staff Nurses to Evaluate the Two Oral Assessment Tools

The feasibility of utilizing the two chosen assessment tools by nurses in the dialysis unit was determined by 1) the length of time it took to instruct the staff nurses to master utilization of the tools, 2) the length of time it took for the nurses to use the tools, and 3) the opinion of the staff nurses on the value and practicality of the tools. Each nurse participating in the study was asked to complete a questionnaire, entitled Staff Nurses Evaluation of the Two Oral Assessment Tools, as found in Appendix C. Information was elicited regarding their opinion of the feasibility of using the two tools in an ongoing assessment of the oral status of dialysis patients.

Design

This study was descriptive and comparative in design. The purpose of the study was to describe and compare each oral assessment tool as related to a dialysis patient population. A comparison was made as to whether one tool picked up pathology while the other did not. In addition, this study described the staff nurse's opinions on the feasibility and practicality of the two tools. Objective data was also obtained as to the feasibility and practicality of the tools. The length of time it took to instruct the staff nurses to

master utilization of the tools and the length of time it took for the nurses to actually use the tools was recorded. A descriptive design is the appropriate choice when the purpose of the study is to describe and compare the characteristics of oral assessment tools.

Procedure

Prior to assessing the oral hygiene status of patients, the following procedures were followed:

1. The investigator was instructed by a dental hygienist at the health sciences center dental school on how to utilize the O'Leary Plaque Record. Interrater reliability of .98 was established between the investigator and the hygienist. The following formula was used for computation of all interrater reliability scores obtained on the O'Leary Plaque Control Record and the Bruya-Madeira Guide for Assessment of the Mouth for the purposes of the study.

$$\text{Score} = \frac{\text{scored agreements}}{\text{scored agreements and disagreements}}$$

2. The principal investigator and two additional registered nurse investigators conducted a pilot study utilizing the Bruya-Madeira Guide for Assessment of the Mouth in order to determine a reliability coefficient. The setting was a private hospital. The sample was comprised of 10 subjects, including comatose, elderly, and hemodialyzed patients. A interrater reliability coefficient of .96 was obtained.

3. Following a teaching method utilized by the dental

hygienists, the investigator instructed the two staff nurses from the hemodialysis unit on how to utilize each of the two oral assessment tools.

4. The time required to teach the methods of evaluation in order to achieve acceptable reliability of performance was recorded.

To collect data on the oral hygiene status of the dialysis patient, the following procedures were followed:

1. Each patient entering the dialysis unit was screened before beginning the study for number of teeth, presence of hepatitis, age, and willingness to participate in the study.

2. Prior to beginning the assessment, a consent form was obtained from all patients who chose to participate (Appendix D).

3. Demographic information was verbally elicited from each patient and recorded (A copy of the data collection form can be found in Appendix E).

4. The Bruya-Madeira tool was utilized to assess the physical and oral status of the patient. Physical status variables were first evaluated by observing the subject for level of conciousness, breathing habits and self care ability. The subject informed the investigator as to his nutritional habits and diet. Inspection of the oral cavity was accomplished using a pen light and tongue blade. The lips were felt by the investigator in order to assess texture. Information as to voice and taste changes were elicited from the subject.

Each subject was asked if he had a metallic or salty taste in his mouth or if he had noticed an alteration in his taste. The investigator would give an example of a specific food and ask if it tasted like it always had. Chewing ability was evaluated during the process of chewing the tablet for the O'Leary Plaque Record assessment.

5. Next, the O'Leary tool was used to measure plaque formation on the teeth. A pen light and mouth mirror were utilized to improve visualization. An erythrosine dye (F, D, & C #3) tablet was chewed, swished in the mouth and rinsed, then expectorated. The examination was completed and the patient brushed the dye from his teeth.

6. Subjective visual impressions of each oral cavity were recorded.

7.The investigator initially measured interrater reliability with the two staff nurses using one dialysis subject. The interrater reliability coefficients were .92 and .94 for the Bruya-Madeira Record and .94 and .96 for the O'Leary Plaque Control Record. Each staff nurse then collected data on three more subjects from the dialysis unit. Of these additional three subjects, interrater reliability was rechecked by the investigator on two of the three subjects done by each staff nurse. The interrater reliability scores obtained may be found in Table I. The principal investigator then assessed the remaining nine subjects.

8. When a condition of oral neglect was found the dialysis patient was informed, as was the head nurse of the dialysis

Table 1

Interrater Reliability Scores of Two Staff Nurses and Investigator Pertaining to the Two Subjects Evaluated by Each Staff Nurse

Staff Nurse I	Subject I	Subject II
Bruya-Madeira Guide for Assessment of the Mouth	.92	.96
O'Leary Plaque Control Record	.98	.96
Staff Nurse II		
Bruya-Madeira Guide for Assessment of the Mouth	.94	.94
O'Leary Plaque Control Record	.96	.94

unit and the physician in charge of patient management, with the stipulation that a dentist would be notified by either the head nurse or the physician as to the scores obtained on each assessment tool. Oral neglect was defined as a score of greater than 17 on the Bruya-Madeira Guide for Assessment of the Mouth and a score of greater than 10% on the O'Leary Plaque Control Record.

After the data had been collected on all the patients, opinions were elicited from the two staff nurses participating in the study as to the feasibility of these two tools. Information regarding the efficacy, practicality, and frequency of use for each tool were evaluated.

Chapter III

RESULTS

The first purpose of this study was to evaluate the use of two oral assessment tools in the hemodialysis unit in order to determine their adequacy for assessing the status of the oral cavity. The second purpose of this study was to determine whether these two tools would be feasible for use by staff nurses in the hemodialysis unit.

The Bruya-Madeira Guide for Assessment of the Mouth and the O'Leary Plaque Control Record were administered to a sample of 16 hemodialysis patients from a federal government medical center. During the month of March, 1980, 26 patients were being dialyzed in the hemodialysis unit. Only one patient refused to be evaluated on the basis of "being sick of all these tests." Nine additional subjects were ineligible because they were edentulous. Data analysis was done on a sample of 16 subjects.

The sample for the second purpose of the study consisted of two staff nurses from the same hemodialysis unit. During the month of March, 1980, eight nurses were working in the hemodialysis unit. Of these eight nurses, two chose to participate in the study. A questionnaire regarding feasibility and practicality of each of the two oral assessment tools was administered to each nurse, as appears in Appendix C.

A descriptive analysis regarding the feasibility for utilizing these two tools in nursing practice was done.

Characteristics of the Patients in the Hemodialysis Unit

All of the subjects participating in this study were male. All but one of the subjects were Caucasian. The other subject was Mexican-American. Subject ages, as displayed in Table II, ranged from 32 to 62 years, with the mean age being 49 years.

None of the subjects was receiving oxygen therapy or intermittent mechanical suctioning. None of the subjects breathed through their mouths. DeWalt and Haines (1969) have described the above stressors as being detrimental to the oral cavity.

Each subject was receiving dialysis treatments for chronic renal failure. The length of time the subjects had been on hemodialysis ranged from less than one year to nine years. The mean number of years on dialysis was three years. Because each subject had renal failure, he was susceptible to the stressors of this disease process. Alterations in the serum hematocrit, calcium-phosphate product and serum urea concentration may lead to oral cavity pathology. The oral manifestations of chronic renal failure may be a change in taste, pallor of the mucous membranes, increased plaque scores and calculus formation or a loss of teeth. Hepatitis, following numerous blood transfusions, may discourage dentists from

Table II

The Distribution of Sample Subjects According to Age

Age	Number N=16	Percentage N=16
30-39 years	2	12.5
40-49 years	5	31.0
50-59 years	7	44.0
60-69 years	2	12.5
Total	16	100.0

treating dialysis patients, with a subsequent lack of needed oral care.

Figure 2 is a histogram demonstrating the number of missing teeth for each of the 16 subjects evaluated. The range for number of teeth missing was from 3 to 26, the mean number of teeth missing was 11.

Of the 16 subjects evaluated in the study, 12 (75%) had at least 16 of their own teeth. The number of teeth missing from the sample of 16 subjects can be broken down as follows: 6 (38%) were missing 5-9 teeth; 5 (31%) were missing 10-14 teeth; 2 (12%) were missing 15-19 teeth; 2 (12%) were missing 20-29 teeth; and one subject (6%) was missing four or less teeth.

From Figure 3 it can be seen that the majority of subjects received a dental evaluation within six months of participating in this study. The period of time since the subject's last dental examination ranged from 1 month to 3½ years. The mean number of months since the last dental examination was 11 months. The greatest percentage of subjects had seen a dentist within 6 months, 56%, followed by 25% having seen a dentist within 1 year, 6% within 19-24 months, 6% within 25-30 months and 6% within 31-36 months. Also noted was that of the 16 subjects receiving an oral assessment, all subjects missing 16 or more of their teeth had been seen by a dentist within the past year.

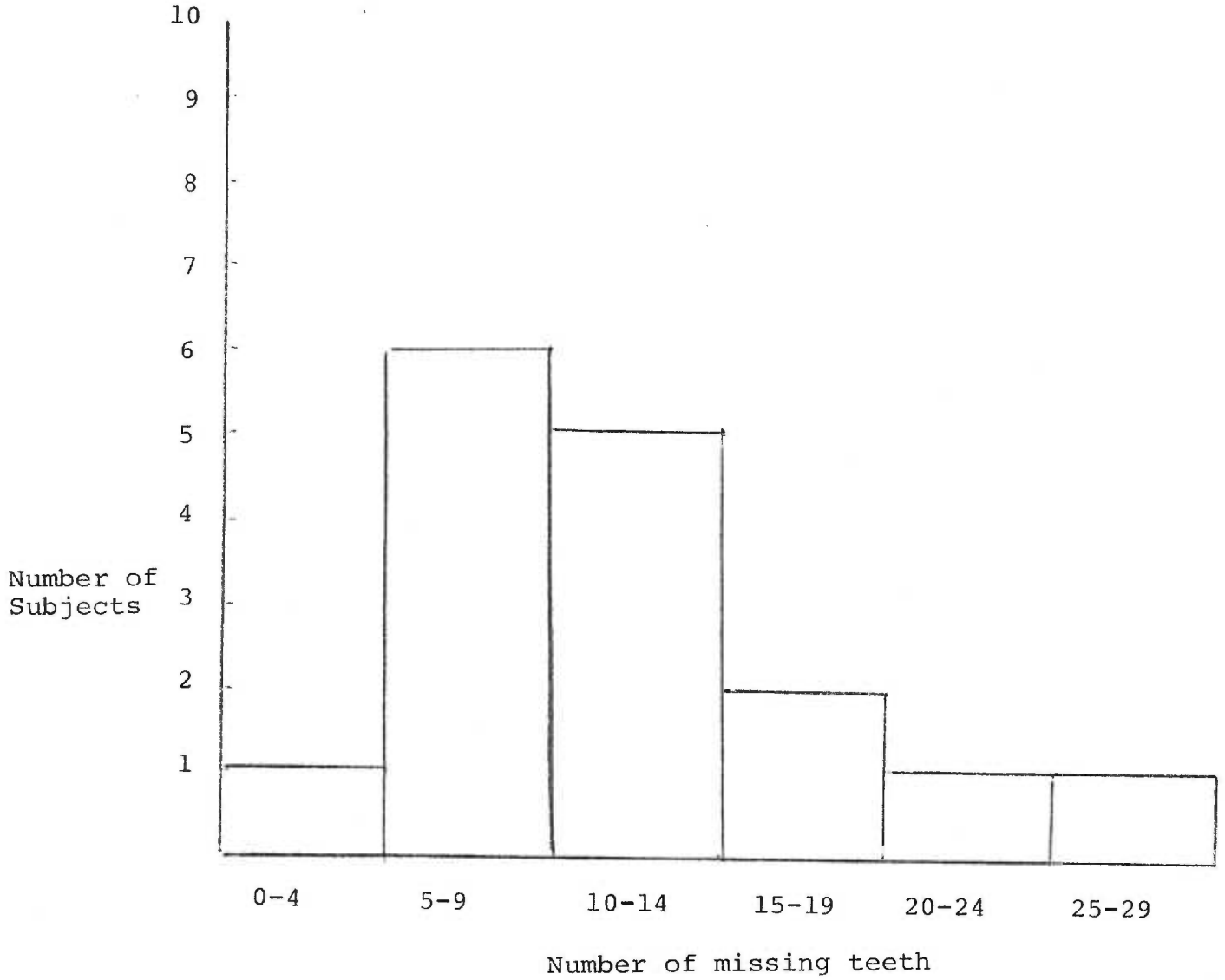


Figure 2. Number of teeth missing from each of 16 subjects

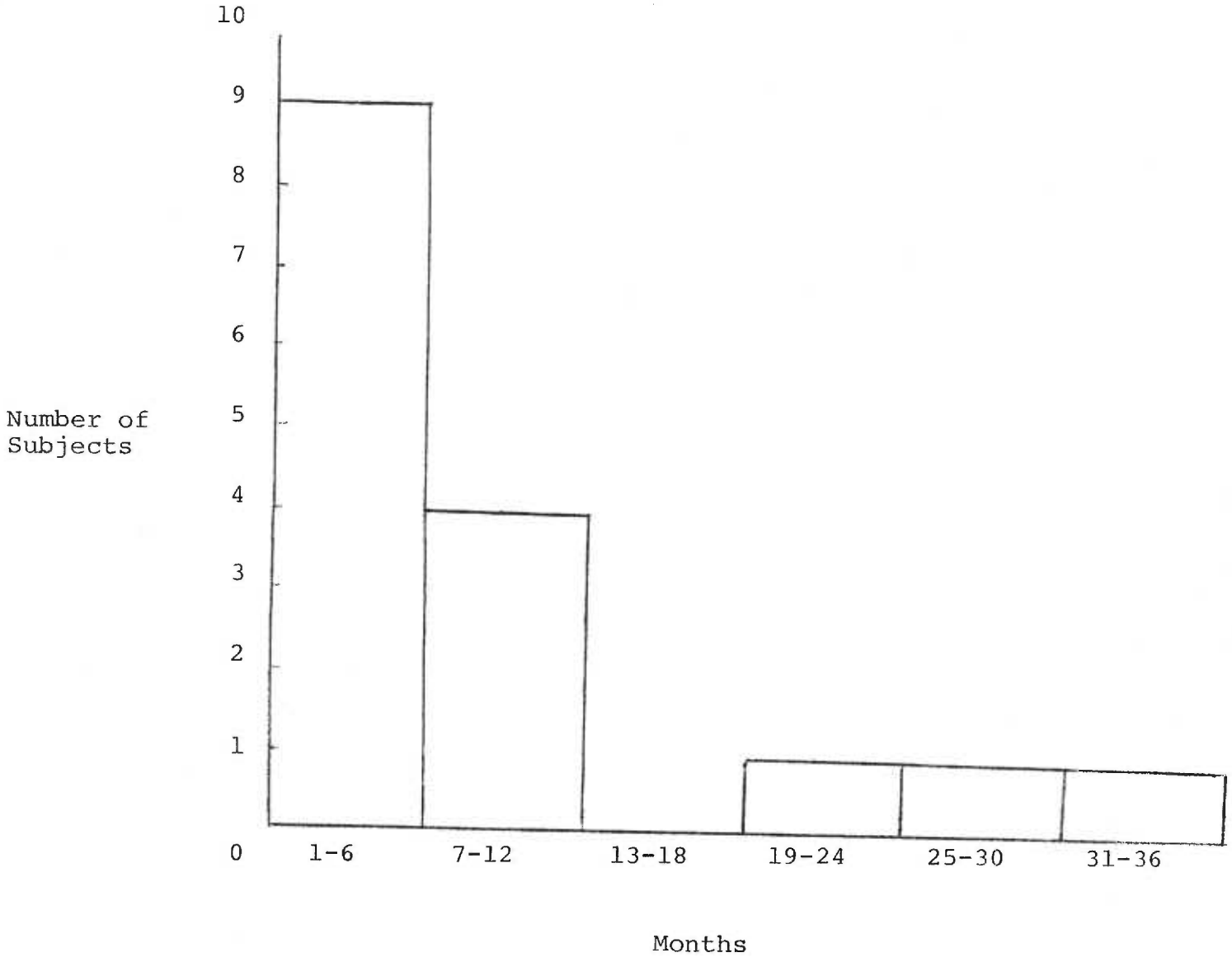


Figure 3. Number of months since last dental examination

Results of the Bruya-Madeira Guide for Assessment of the Mouth

The range of scores on the Bruya-Madeira Guide for Assessment of the Mouth was from 17 to 21 points as can be seen in Figure 4. A table of individual scores appears in Appendix F, Table A. The possible range for this tool was from 17-51 points. Any score greater than 17 was indicative of pathology for the purposes of this study. There were four subjects, or 25% of the sample, receiving a perfect score of 17. The remaining 12 subjects, or 75% of the sample, received a score of greater than 17.

Variations from a perfect score of 17 points occurred in nine subject assessments in the category of nutritional habits/diet. Five subjects varied from a score of 17 in the category of mucous membrane of the palate, uvula and tonsillar fossa. Changes were also noted once in each of the following categories: chewing ability, lips/texture, tongue/texture, teeth and taste. The Bruya/Madeira Guide for Assessment of the Mouth appears in Appendix B.

Results of the O'Leary Plaque Control Record

The O'Leary Plaque Control scores ranged from 11 to 83%, with the mean score being 35.87% (see Figure 5). For the list of individual scores, please see Appendix F, Table A. Of the 16 subjects being evaluated, all received a score of greater than 10%. A score of greater than 10% has been judged to be indicative of pathology by O'Leary (1972). The subject receiving 83% on the O'Leary Plaque Control Record

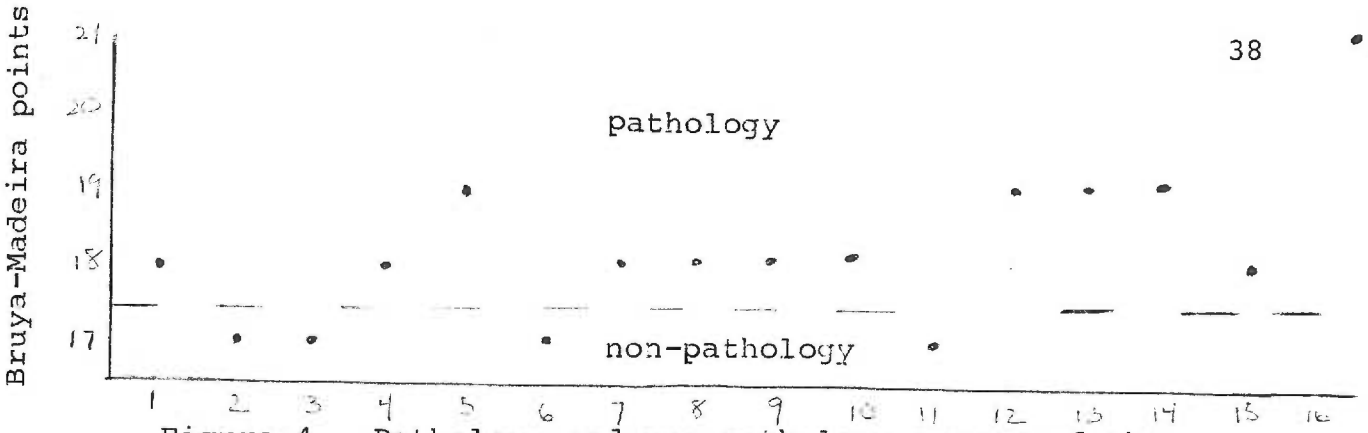


Figure 4. Pathology and non-pathology scores of the 16 subjects on the Bruya-Madeira Guide for Assessment of the Mouth

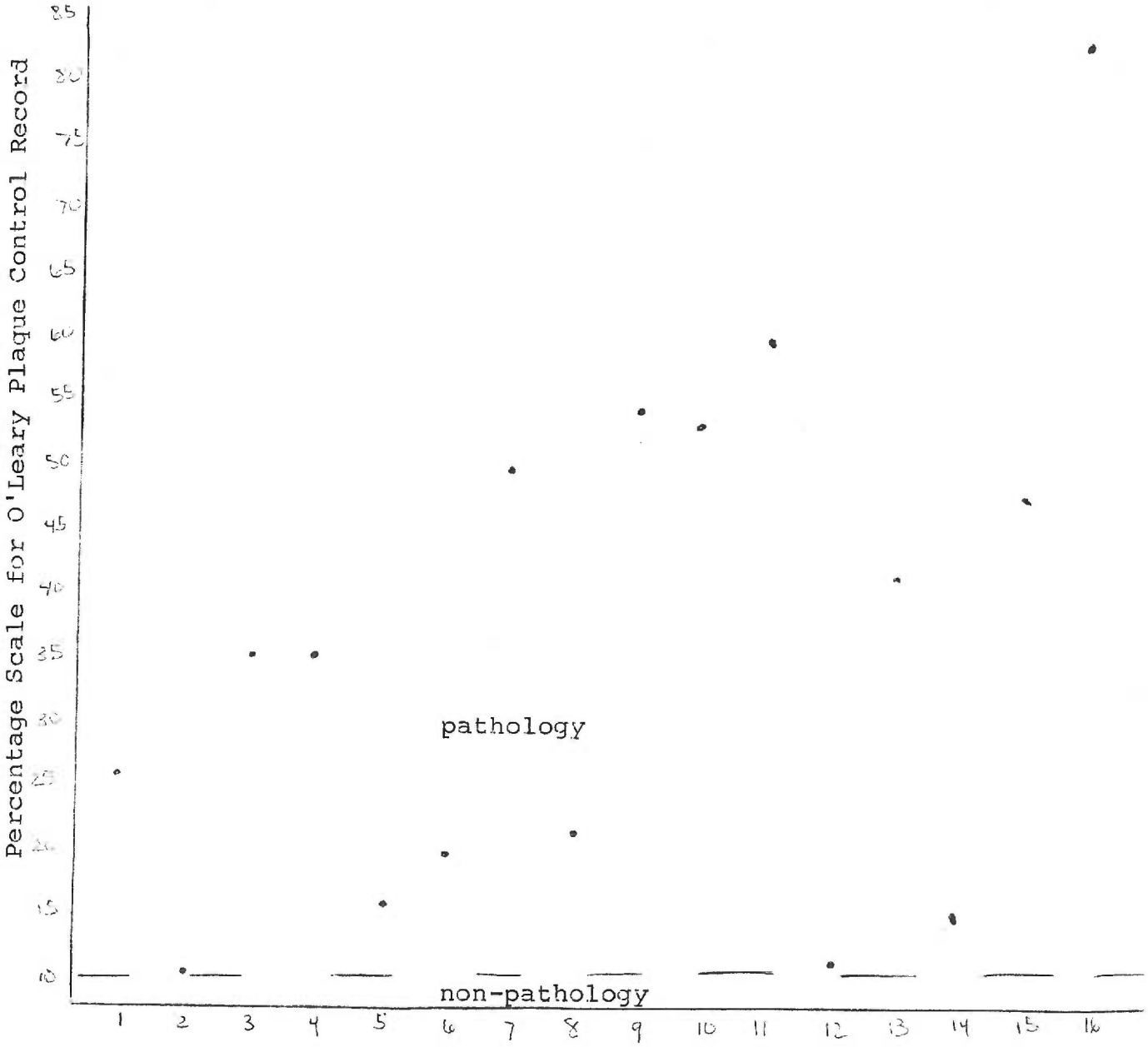


Figure 5. Pathology and non-pathology scores of the 16 subjects on the O'Leary Plaque Control Index

was missing the greatest number of teeth, 26, and also received the highest score, 21 points, on the Bruya Guide for Assessment of the Mouth.

Comparison of the Two Oral Assessment Tools

The only area for direct comparison between the O'Leary Plaque Control Record and the Bruya-Madeira Guide for Assessment of the Mouth is the extent to which they detect pathology. A score of greater than 10% is indicative of pathology for the plaque record (O'Leary, 1972), while greater than 17 points indicates pathology on the oral assessment guide. A contingency table related to the detection of pathology appears in Figure 6. This contingency table indicates that 12 subjects scored in the pathological range for both tools, or 75% of the total number of subjects. The remaining 4 subjects, or 25%, were detected as having pathology on the O'Leary Plaque Control Record, but not on the Bruya-Madeira Guide for Assessment of the Mouth. For the four subjects receiving a non-pathology score on the Bruya-Madeira tool, their O'Leary scores were 11%, 19%, 35% and 59%. A score of greater than 10% indicates pathology on the O'Leary tool. These scores range from 1-49 percentile points higher than that required to indicate pathology on O'Leary's Plaque Control Record.

Chi square was used to compare pathology and non-pathology scores on the O'Leary Plaque Control Record and the Bruya-

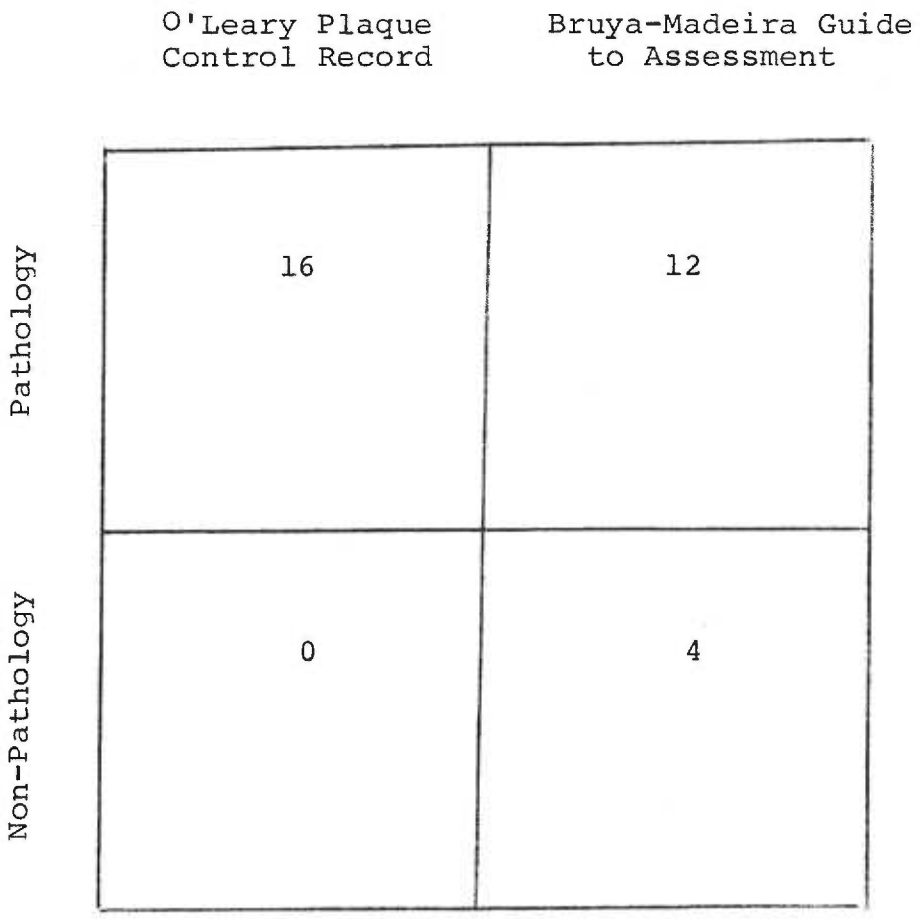


Figure 6. Number of subjects receiving pathology or non-pathology scores on two oral assessment tools

Madeira Guide for Assessment of the Mouth. The O'Leary Plaque Control Record was utilized as the expected value because it is a widely used tool for oral assessment within the dental profession and is the tool recommended for use by dental experts. The observed data came from the Bruya-Madeira Guide for Assessment of the Mouth, which a literature review demonstrates has never been tested in a clinical setting. A computed value of 4.082 was obtained, significant at $p < .05$, $df = 1$. Therefore, it may be concluded that the two oral assessment tools are significantly different when comparing the presence or absence of pathology.

Characteristics of the Staff Nurses

Both nurses participating in this study were female and Caucasian. A bachelor of science degree in nursing was held by one nurse and the second nurse possessed a diploma in nursing. The number of years each nurse worked in the hemodialysis unit was nine years and one year.

Evaluation of Oral Assessment Tools by Staff Nurses

The time required to teach the two staff nurses the use of these two oral assessment tools was 30 minuts. Approximately five minutes was used to teach the Bruya Assessment Guide for the Mouth, and the remaining 25 minutes for the O'Leary Plaque Control Record. Each nurse stated that she could easily teach the use of the two oral assessment tools in 30 minutes to fellow staff nurses.

Table III indicates the mean period of time spent by the two staff nurses and the investigator in utilizing the assessment tools for actual subject evaluations. The amount of time needed was almost identical for all three evaluations.

The results of the questionnaire and recommendations made by the two staff nurses are found in the discussion chapter. A copy of the questionnaire may be found in Appendix C. A descriptive analysis of the two questionnaires was done.

In summary, this study had two purposes. The first purpose was to compare the O'Leary Plaque Control Record with the Bruya-Madeira Guide for Assessment of the Mouth in a hemodialysis unit. The second purpose of the study was to determine whether these two tools would be feasible for use by staff nurses in the hemodialysis unit. A sample of 16 subjects had the two oral assessment tools administered while they were being hemodialyzed in a large federal government hospital. The oral assessments were completed by two staff nurses from the hemodialysis unit and the principal investigator.

Information collected while completing the oral assessments was as follows. All of the subjects were male, 96% were Caucasian, and the mean age was 49 years. The majority of subjects had seen a dentist within 6 months and 75% possessed more than 16 of his own teeth.

Oxygen therapy or intermittent mechanical suctioning was not being therapeutically utilized for any of these subjects. None of the subjects breathed through their mouths. Each

Table III

Mean Length of Time Necessary to Assess the Oral Cavity Using Two Oral Assessment Tools

Nurse Evaluaters (N=3)	O'Leary Plaque Control Record (mean length of time in minutes)	Bruya-Madeira Guide Assessment of the Mouth (mean length of time in minutes)
Staff nurse #1	5-7	2
Staff nurse #2	5-10	2
Investigator	5-10	2-3

subject had chronic renal failure and was subsequently subject to the stressors related to the uremic disease process.

The range of scores on the Bruya-Madeira Oral Assessment Guide was 17-21 points. The O'Leary Plaque Control Record had a range from 11-83%, with a mean score of 35.87%. The Bruya-Madeira Oral Assessment Guide picked up oral pathology in 75% of the subjects, while the O'Leary Plaque Control Record noted pathology in 100% of the subjects.

Chi square analysis revealed that the two tools were significantly different when comparing the presence or absence of pathology.

The staff nurses participating in this study were both Caucasian and female. The time needed to assess the oral cavities using both tools was approximately 10 minuts. Only 30 minutes were necessary to teach the use of the two tools in order to obtain an acceptable level of interrater reliability (.90).

Chapter IV

DISCUSSION

This study had two purposes. The first purpose of this study was to compare a known and widely used oral assessment tool with a written but not tested assessment tool in the hemodialysis unit. The second purpose of this study was to determine whether these two tools would be feasible for use by staff nurses in the dialysis unit. A sample of 16 subjects had the two oral assessment tools administered while they were being hemodialyzed. In addition, a questionnaire related to the feasibility and practicality of the tools was given to the two staff nurses participating in this study. The questionnaire entitled Staff Nurse Evaluation of the Two Oral Assessment Tools appears in Appendix C.

Discussion of Findings

In discussing the adequacy with which these tools identified significant pathology for the hemodialysis patient population, one must correlate what was identified using these tools with information already present in the literature. Numerous changes occur in the oral cavity of the dialysis patient. Alterations in the blood urea level, serum calcium-phosphate product and in the blood hematocrit are manifested in the oral cavity of the dialysis patient.

Uremic patients frequently complain about a metallic or salty taste in their mouths, altered taste, or the odor of ammonia on their breath (Epstein, 1970; Merrill & Hampers, 1971; Price & Wilson, 1978). It has been suggested that each of these signs and symptoms is related to an elevated level of blood urea due to the uremic process (Merrill & Hampers, 1971). Only one subject, or 6%, described having altered taste, and he felt this was due to smoking. The remaining fifteen subjects, or 94%, described having no metallic taste in the mouth, alteration in taste, or the odor of ammonia on their breath. Although the literature cites these problems as occurring frequently in the dialysis patient population, these subjects do not support the literature assertion. Perhaps these subjects did not demonstrate the above symptoms because they had a reduced serum urea level secondary to the dialysis treatment. All oral assessments were completed while the subjects were receiving dialysis treatment.

In addition to the alteration in blood urea, an altered serum calcium-phosphate product has been discussed in the literature (Merrill & Hampers, 1971; Westbrook, 1978). It is believed that this alteration in the serum calcium-phosphate product results in deposits of dental calculus forming at an accelerated rate. Subjective visual examination revealed that 11 subjects, or 69%, had calculus which was not stained by the erythrosine dye used with the O'Leary Plaque Control Record. The Bruya-Madeira Guide for Assessment of the Mouth

also did not evaluate calculus on the teeth. Thus, although dental calculus deposits are expected in the dialysis patient population, and were noted to be present, neither tool adequately identified calculus deposits.

The third classic oral manifestation found in patients receiving hemodialysis is pallor of the oral mucosa (Merrill & Hampers, 1971; Westbrook, 1978). This mucosal pallor is a reflection of the anemic condition of many of these patients whose hematocrits are maintained between 15% to 25%. The Bruya-Madeira assessment guide did identify a change from normal pink to a pale mucous membrane in 5 subjects, or 31%. This is an expected finding as reported in the literature.

The literature reveals dehydration as being a potential problem for the dialyzed patient. In analyzing the data on the Bruya-Madeira Assessment Guide, it was noted that nine patients, or 56%, had been placed on a limited fluid intake. The scores received on the tool did not appear to demonstrate an overall condition of dehydration in these 16 subjects. The range for scores on this tool was from 17-21 points. The highest possible score that can be received which is indicative of the greatest amount of pathology and dehydration, is 51 points. Although 56% of the subjects were on a fluid restriction, all of the subjects were admitted to the unit above their ideal weight. This is an indication of excess body fluid and not dehydration. The tool does appear to be capable of evaluating a change in hydration status, but none of the

subjects studied were dehydrated.

The literature also states that many hemodialysis patients have a condition of oral neglect subsequent to a lack of routine dental care. This lack of routine dental care could be due to patient neglect or to the unwillingness of dentists to treat these patients who are at high risk for hepatitis (Kirkpatrick & Morton, 1971; Donaldson, 1972; Uthman, 1975). In this study, it was noted that 9 subjects, or 56% of the sample had seen a dentist within six months, and an additional 4 subjects, 25%, had seen a dentist within one year. None of the subjects stated having any problems in finding a dentist willing to care for them. These subjects do not support the literature which concludes that dentists are reluctant to treat dialysis patients.

Two oral surgeons, Kirkpatrick and Morton (1971), revealed that the mean age of the dialysis patients they treated from 1969 to 1970, was 35.8 years. The mean number of teeth missing from this population was 9.4 teeth. In comparison, 16 subjcts from this current study had a mean of 11 teeth missing in the 30-39 year age group. Kirkpatrick and Morton use the number of teeth missing as a guide to the extent of dental disease and treatment needed in a population appearing to have a greater inclination towards oral cavity disorders. The number of teeth missing is slightly higher in the present study. Using missing teeth as a measure of dental disease, as well as the scores received on the O'Leary Plaque Control

Record and Bruya-Madeira Guide for Assessment of the Mouth, it appears the current study population needs an additional measure of oral cavity care.

Shapiro, Pollack and Gallant (1971) completed dental examinations on 157 women inmates from October, 1969 to December, 1969. Two oral assessment tools were utilized by the authors to evaluate the subjects, a periodontal index and a simplified oral hygiene index. The simplified oral hygiene index measured plaque as one of its categories. A trend of increasing mean scores was noted with the advancing age of the subjects for both indices. The O'Leary Plaque Control Record, like the simplified oral hygiene index, also demonstrated a trend of increasing mean scores with advancing age as can be found in Table IV. All hemodialysis patients potentially are at risk for oral disease, and with advancing age these patients may have a substantially greater risk for developing oral pathology.

The two assessment tools were reported to be effective in detecting oral pathology. In comparing the two tools, it was noted that 12 subjects demonstrated pathology scores on each tool but that the O'Leary tool picked up an additional four subjects with pathology (see Figure 6). Using both tools, 100% of the dialysis patient population had demonstrated oral pathology. A chi-square analysis was also utilized to compare pathology and non-pathology scores on the O'Leary Plaque Control Record and the Bruya-Madeira Guide for Assessment

Table IV

The Distribution of Mean O'Leary Plaque Control Record Scores of 16 Sample Subjects According to Age

Age	Mean O'Leary Plaque Control Record Scores (Possible Range 0-100%)
30-39 years	18.0
40-49 years	31.0
50-59 years	36.0
60-69 years	65.0

of the Mouth. It was concluded that the two oral assessment tools were significantly different when comparing the presence or absence of pathology. Because the O'Leary Tool is widely used by the dental profession it may be concluded that it is a more precise indicator of oral pathology than the Bruya-Madeira tool. However, the Bruya-Madeira tool does identify oral cavity and physical status changes which can not be evaluated by the O'Leary Plaque Control Record. Reviewing the literature it becomes readily apparent that plaque must be evaluated in the dialysis patient population. The literature also supports the evaluation of mucosal pallor, taste changes, hydration status and other stressors such as oxygen flow, mouth breathing and chewing ability. Each of these are assessed with the Bruya-Madeira Guide for Assessment of the Mouth. It appears that both tools are necessary if one is to accomplish a thorough examination of the hemodialysis patient's oral cavity and be assured no pathology is going to to be missed. Perhaps an adaptation of the two tools will be a logical choice for a new oral assessment tool to be utilized in a hemodialysis unit. The recommended changes reported by the two staff nurses for each of the tools will follow.

The two staff nurses participating in the study assessed each tool using a questionnaire entitled Staff Nurse Evaluation of the Two Oral Assessment Tools, which may be found in Appendix C. The feasibility of utilizing the two tools was

assessed and suggested tool modifications were also reported.

In discussing the feasibility and practicality of utilizing these two oral assessment tools, it was noted that the time spent in teaching the use of the tools was only 30 minutes. The time necessary to actually evaluate each subject was also minimal, approximately 10 minutes to use both tools (refer to Table III).

Modifications were suggested for each tool. These modifications appeared to be easy to incorporate into each tool. It was agreed by both staff nurses that it was indeed feasible to use these tools to evaluate patients' oral statuses. Also, they agreed that the tools appeared to adequately identify those areas of oral health cited in the literature as being relevent to the hemodialysis patient population.

Both staff nurses responded that the following changes would be indicated in devising a more concise and practical oral assessment tool for use in a hemodialysis unit. The nurses reported that changes needed to be made in the areas of nutritional habits, mucous membrane conditions and plaque scoring.

When asked to make specific changes on the Bruya-Madeira Assessment Guide, each nurse noted that changes needed to be made in the area of nutritional habits. It was felt that nutritional habits should become two categories with regard to type of diet and amount of fluid intake.

The change might be made as follows:

Present tool:	3	2	1
c. nutritional habits/diet	NPO, dehydrated gastrostomy, jejunostomy, I.V. lines	nondetergent diet variable or limited fluid intake	normal fluid and detergent diet

Revised tool:

Nutritional habits	3	2	1
Diet	gastrostomy, jejunostomy, I.V. lines, NG tube	nondetergent diet	detergent diet
Fluid intake	NPO, dehydrated	limited fluid intake	normal fluid intake

Rationale: In evaluating the subjects it was difficult to determine whether a score of one or two was warranted in the nutritional category because the majority of subjects were on a detergent diet but also had a restricted fluid intake. As the present tool is written, it is impossible to identify precisely a score for the subject having a normal diet and a limited fluid intake.

The second suggested change might be made as follows:

Present tool:	3	2	1
c. Mucous membrane of the palate, uvula, and tonsillar fossa	red with general inflammation, blisters and pin-point brown spots on palate subsequently, oral mucosa becomes pale, almost white	dry, pale palate	moist, pink

Revised tool:

	3	2	1
mucous membrane of the palate, uvula, and tonsillar fossa	red with general inflammation, blisters and pinpoint brown spots on palate	dry palate, and/or pale palate, and/or moist, pale palate	moist and/or pink

Rationale: In utilizing the Bruya-Madeira Oral Assessment Tool to evaluate the condition of the mucous membranes it was impossible to differentiate between those subjects having only a dry palate and those having only a pale palate. Reviewing the literature it was apparent that a dry palate and a pale palate are each indicative of oral cavity deterioration. Many of the study subjects had a moist and pale palate which was felt by the staff nurses to also be indicative of oral cavity pathology. For this reason, it was suggested that an additional option for evaluation might be a moist and/or pale palate.

The final suggestion was made concerning the categroy of teeth. The suggested change for this category might be made as follows:

Present tool:

	3	2	1
e. teeth	dull, debris clinging to two-thirds of surfaces visible	dull, mucus and debris clinging to enamel in one-half area visible	glossy, no debris

Revised tool:

Disregard the present category of teeth as presently written. Incorporate the O'Leary Plaque Control Index

and a method for identifying calculus. A possible method for scoring might be:

		3	2	1
e.	O'Leary Plaque Control Record	score of 61-100% on plaque record	score of 31-60% on plaque record	score of 0-30% on plaque record
	Calculus	Present on greater than two-thirds teeth	Present on two-thirds teeth	Present on one-third teeth

Rationale: The present category on teeth does not precisely evaluate plaque or calculus which are the precursors to oral cavity deterioration. The O'Leary Plaque Control Record appeared to quantitatively measure the amount of plaque present in the oral cavity. To utilize a dental method for evaluating calculus is contraindicated for use by nurses because probing is involved. Probing may cause a systemic infection arising from the oral cavity (Maher & Golden, 1962).

Criteria other than nutritional habits, mucous membranes and teeth would remain as in the original tools (see Appendix A and B). Following is additional information the nurses felt should be included on the revised tool.

Additional information each staff nurse suggested be included in the revised tool was:

Revised tool:

Prior to assessing the oral cavity, determine:

1. Age of the subject
2. Has the subject had any difficulty in finding a dentist to care for him/her?

Rationale: Shapiro, Pollack and Gallant (1971) reported that advancing age appears to increase the risk for oral disease. Plaque scores appeared to increase with age.

Many dentists are reluctant to treat hemodialysis patients (Kirkpatrick & Morton, 1971; Donaldson, 1972; Uthman, 1975). If the subject was experiencing difficulty in locating a dentist, the nurse would direct him/her to a dentist who does care for these patients.

Each nurse felt that there was a necessity for detecting oral pathology in the dialysis patient population and that this evaluation was a nursing responsibility. Each nurse felt that both tools should be utilized in evaluating dialysis patients after the suggested revisions had been made. The frequency of evaluation varied widely. One nurse felt the tools should be used every six months, because that is how often one is supposed to see the dentist for oral cavity evaluation. The other nurse suggested the tools be utilized at the beginning of every month in order to monitor oral cavity changes. She felt it was necessary to note whether the scores improved or deteriorated so that prompt oral hygiene measures may be instituted.

The problems identified by these nurses in trying to implement the use of these tools were: 1) staff resistance, and 2) patient resistance. Suggestions on how to deal with these problems were not given by either nurse.

In summary, both nurses stated that they were aware of

the importance of oral assessment for the dialyzed patient and that they would utilize a plan of oral assessment in their future practice. They also suggested modifications for each tool, noted the frequency for use, and stated potential problems in implementing a revised tool. Although a small number of nurses participated in the study, other nurses familiar with the tools have given similar suggestions for improvement.

In examining the Bruya-Madeira Guide for Assessment of the Mouth and the O'Leary Plaque Control Record it appears that with modifications and when used together, they do adequately assess the oral cavity. The areas measured by each tool have been supported in the literature.

The use of the tools was learned by the two staff nurses in 30 minutes. The approximate time to actually examine the oral cavity was ten minutes. The amount of time necessary for evaluation makes these tools very feasible for use by staff nurses in a hemodialysis unit.

Implications for Nursing

It is the responsibility of all nurses caring for patients to carry out routine, frequent, careful oral cavity examinations in order to detect oral pathology and institute a plan for correction of the condition. It is even more imperative that nurses caring for hemodialysis patients utilize a valid method of oral assessment, because their patients stand a substantial

chance for oral pathology to occur which may lead to systemic infection and even death (Balch, 1955; Maher & Golden, 1962).

This study was designed to contribute to the body of knowledge the nursing profession possesses regarding oral assessment tools with regard to detecting pathology in a hemodialysis patient population. In addition, it provided information as to the feasibility and practicality of using these two tools as a method for ongoing evaluations of the oral cavity of patients.

Furthermore, this study documented the need for oral assessment in the dialysis patient population. When utilizing the O'Leary Plaque Control Record, 100% of the subjects had a pathological oral cavity condition, and when assessing the oral cavity with the Bruya-Madeira assessment tool 75% of the subjects had a pathological oral condition.

In attempting to implement the use of these tools in routine practice, it would be helpful to have all materials readily accessible to the staff nurses. At present, the mouth mirrors and erythrosine dye must be obtained from the hospital's dental service. Also, the patients may be more willing to comply with repeated examinations if they were implemented as a dialysis unit routine. Each subject was interested in knowing what score he received and what the investigator would recommend to improve the scores. The nurses would accept the responsibility, with less resistance, if an oral evaluation was made a part of their job description.

A protocol describing what was to be done at certain score intervals would probably also be of assistance in planning patient care.

Limitations

This study has limitations in the following areas:

1. Only 16 subjects were available for evaluation with the two oral assessment tools and all of these subjects were male. Only one of the 16 subjects was not Caucasian. A variation in ethnic groups was not studied.

2. An evaluation was made regarding only the length of time since the last dental examination. The purpose of this examination is not known. Also, the frequency or extent to which routine dental care is sought by these subjects is not known.

3. Neither of these tools could be utilized with edentulous subjects, thus of an initial sample of 25, 36% were excluded due to a lack of teeth. This was a higher proportion of edentulous patients than was expected.

4. Only two nurses agreed to participate in this study and so all comments regarding the feasibility and practicality of the tools came from a very small sample.

Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This study attempted to identify an effective method of assessment of the oral cavity which could be utilized by nurses in the hemodialysis unit of a large metropolitan, federally funded hospital. The investigator and two staff nurses from the dialysis unit collected data on the oral cavity conditions of 16 hemodialysis patients who were eligible for participation in this study. It appeared that with modifications, the two tools when utilized together, did evaluate those areas of the oral cavity which are directly related to the hemodialysis patient population.

In addition, the feasibility of using these tools as a method for ongoing nursing oral assessment was examined through the use of a questionnaire given to the two staff nurses participating in this study. The length of time necessary to teach the use of the tools, and the amount of time needed to collect the data appeared to be minimal and thus feasible for routine use.

The following are recommendations for areas needing further study:

1. Incorporate the revisions that have been suggested and retest the new tool with a larger sample.

2. Evaluate the tools over an extended period of time, in order to demonstrate oral cavity condition changes and to determine the frequency of assessments that should be done.

3. Utilize the revised tool with transplant patients.

4. Evaluate the oral cavity for the presence of bacteria and compare those findings with the score from the revised tool.

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REFERENCES

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APPENDICES

APPENDIX A

O'Leary Plaque Control Record

O'Leary Plaque Control Record

Identification number:_____

Date: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

1) Mark out all missing teeth.

2) Record in red (-) all surfaces with plaque present.

3) $\frac{\text{\# surfaces with plaque}}{\text{\# surfaces present}}$ = score

APPENDIX B

Bruya-Madeira Guide for Assessment of the Mouth

Guide for Assessment of the Mouth

Variables	Numerical and Descriptive Rating 3	2	1
1. Physical status			
a. level of consciousness	nonresponsive unconscious	apathetic, occasionally disoriented	oriented to time, place and person responds appropriately
b. breathing habits	respirator, tracheostomy, or endotracheal tube	mouth breather nasal O_2/mask O_2	nose and mouth breathing without mechanical assistance
c. nutritional habits/diet	NPO, dehydrated gastrostomy, jejunostomy, I.V. lines	nondetergent diet variable or limited fluid intake	normal fluid and detergent diet
d. chewing ability	impairment in jaw separation, edentulous--without dentures, overt dental problems, oral disease	edentulous with poorly fitting dentures, limited biting strength	normal teeth and chewing ability
e. self-care ability	total dependence on others	feeds self, performs mouth care with help	totally responsible for self-care

Guide for Assessment of the Mouth

Variables	Numerical and Descriptive Rating 3	2	1
2. Oral Cavity			
a. lips			
texture	cracked, bleeding	rough	smooth, soft
color	red, inflamed, some bleeding	some reddened area	pink
moisture	dry, cracked	blistered	moist
b. tongue			
texture	coated at base, engorged, deeply grooved, thicker than normal	vallate papillae and lingual groove prominent	firm, without fissures or prominent papillae
color	very red tip, sides blistered	pink with reddened areas	pink
moisture	dry with indentations, patient complains of burning	"tongue sticks to roof of mouth," dry	moist
c. mucous membrane of the palate, uvula, and tonsilar fossa	red with general inflammation, blisters, and pinpoint brown spots on palate subsequently, oral mucosa becomes pale, almost white	dry, pale palate	moist, pink

Guide for Assessment of the Mouth

Variables	Numberical and Descriptive Rating 3	2	1
d. gingival tissue	red, shiny, bleeding, edematous	pink to red shiny, edematous	moist, resillient pink
e. teeth	dull, debris clinging to two thirds of surfaces visible	dull, mucus and debris clinging to enamel in one-half area visible	glossy, no debris
f. saliva	ropy, viscid, or mucid	mouth dry or saliva scanty	thin watery entire oral cavity moist
g. taste	impaired	impaired	normal taste sense
h. voice	difficulty in articulating words	deep and raspy	normal tone and quality

APPENDIX C

Staff Nurse Evaluation of the Two Oral Assessment Tools

Staff Nurse Evaluation of the Two Oral Assessment Tools

1. How long did it take to perform each assessment?

   Bruya-Madeira Assessment Guide _____ minutes

   O'Leary Plaque Control Record _____ minutes

2. Could you teach the use of these tools to fellow nurses?

	Yes	No
Bruya-Madeira Assessment Guide	_____	_____
O'Leary Plaque Control Record	_____	_____

3. What important information concerning the oral cavity was identified with each tool?

   Bruya-Madeira Assessment Guide_____

   _____

   _____

   O'Leary Plaque Control Record_____

   _____

   _____

4. What important information concerning the oral cavity was not identified by each tool?

   Bruya-Madeira Assessment Guide_____

   _____

   _____

   O'Leary Plaque Control Record_____

   _____

   _____

5. Attached to this questionnaire are copies of each oral assessment tool. Please make any changes on these tools which you feel would improve their ability to detect pathology in a patient's mouth.

6. Do you feel there is a necessity for detecting pathology and evaluating the oral cavity of patients in the hemodialysis unit?

   Yes_____ No_____

7. If yes, do you feel this is a nursing responsibility?

   Yes_____ No_____

   If no, whose responsibility should it be?_____

8. If you were to do an oral assessment, what tool or tools would you use and how often?

   _____

   _____

   _____

9. What problems would you anticipate in incorporating an oral assessment procedure into routine nursing practice?

   _____

   _____

   _____

10. What suggestions can you offer for implementing an oral assessment into the routine of the hemodialysis unit?

    _____

    _____

    _____

11. Will you incorporate oral assessment into your routine practice?

    Yes_____ No_____

APPENDIX D

Informed Consent

Portland Veterans Administration Medical Center
Portland, Oregon

INFORMED CONSENT

I, _____, herewith agree to serve as a subject in the study named, "Evaluation of Two Oral Assessment Tools For Use by Staff Nurses in the Renal Dialysis Unit," by Deborah Layman, R.N., under the supervision of Sharon Clark, R.N. and Marsha Wolfson, M.D. This study aims at developing a plan for mouth assessment which can be used by nurses to evaluate the dialysis patient's mouth condition.

First, a nurse will look in my mouth and evaluate its condition. A pen light, tongue blade, and mouth mirror will be used. This will take approxiamtely 5 minutes. I will then chew a red dye tablet (FD&C Red #3) in my mouth, rinse and again have my mouth evaluated by the nurse. This will take approximately 10 minutes. After the evaluation is finished I will brush my teeth to remove the remaining dye.

The benefit to me is that I will receive an evaluation of my mouth and if a problem is found I will be notified so that I can get help. I could possibly have a sensitivity reaction to the dye and my gums may stay red for a short period of time after I have brushed my teeth. If I have a reaction to the dye, Marsha Wolfson, M.D. will be told immediately and I will be treated when necessary. If I should get some dye on my clothes, the clothes will be put in cold water unless the fabric cannot be put in water (such as wool). There will be no cost to me for the red dye solution or the toothbrush.

The information obtained will be kept confidential. My name will not appear on the records and anonymity will be assured by the use of code numbers.

Deborah Layman has offered to answer any questions about participation in this study. I understand that I may refuse to participate or withdraw from this study at any time without affecting my relationship with, or treatment at, the Portland Veterans Administration Medical Center.

In the event of physical injury resulting from the study, medical care and treatment will be available at this institution. For eligible veterans, compensation (damages) may be payable under 38USC 351 or, in some circumstances, under the Federal Tort Claims Act. For non-eligible veterans, and non-veterans, compensation would be limited to situations where negligence occurred and would be controlled by the provisions of the Federal Tort Claims Act. For clarification of these laws, contact the District Counsel at (213) 824-7379.

It is not the policy of the Department of Health, Education and Welfare, or any other agency funding the research project in which I am participating, to compensate or provide medical treatment for human subjects in the event the research results in physical injury. However, as a veteran I would be entitled to medical care at this or any other veterans facility. If I suffer any injury from the research project, compensation would be available to me only if I establish that the injury occurred through the fault of the Portland Veterans Administration Medical Center, its officers, or its employees.

I have read and understand the foregoing and agree to participate in this study.

_____ _____

SUBJECT'S SIGNATURE DATE

_____

SUBJECT'S SOCIAL SECURITY NUMBER

_____ _____

RESPONSIBLE PARTY DATE
(IF PATIENT IS UNABLE TO CONSENT)

_____ _____

AUDITOR/WITNESS DATE

_____ _____

PHYSICIAN DATE

APPENDIX E

Data Collection Form

DATA COLLECTION FORM

1. Patient identification number _____

2. Data collector's number _____

   1) Debbie Layman
   2) Staff nurse #1
   3) Staff nurse #2

3. Patient's age (years) _____

4. Patient sex _____

   1) male
   2) female

5. Race _____

   1) Caucasian
   2) Black
   3) Spanish/Mexican American
   4) Oriental
   5) Other

6. Date of last dental examination (months) _____

7. Number of teeth missing _____

8. Did loss of teeth occur during uremic episode or while on dialysis? _____

   1) yes
   2) no

9. Length of time on hemodialysis (months) _____

10. Transplant candidate? _____

    1) yes
    2) no

11. O'Leary Score (%) _____

12. Bruya Guide for Assessment of the Mouth total score _____

APPENDIX F

Tables

Table A

Scores of the 16 Subjects on the O'Leary Plaque Control Record and the Bruya-Madeira Guide for Assessment of the Mouth

Subject (N=16)	O'Leary Plaque Control Record (Possible Range:0-100%)	Bruya-Madeira Guide for Assessment of the Mouth (Possible Range: 17-51 points)
1	15.0	19
2	35.0	17
3	19.0	17
4	11.0	17
5	59.0	17
6	47.0	18
7	26.0	18
8	83.0	21
9	52.0	18
10	35.0	18
11	42.0	19
12	11.0	19
13	48.0	18
14	16.0	19
15	22.0	18
16	53.0	18

AN ABSTRACT OF THE THESIS OF

DEBORAH J. LAYMAN

For the MASTER OF NURSING

Date of Receiving this Degree: June 8, 1980

Title: EVALUATION OF TWO ORAL ASSESSMENT TOOLS FOR USE BY STAFF NURSES IN THE HEMODIALYSIS UNIT

Approved: [redacted]
Sharon R. Clark, M.N., Thesis Advisor

Dialysis patients have been identified to be at high risk for infection arising from the oral cavity. Systemic infection remains the most common cause of death for this population. The oral cavity has been identified as a potential portal of entry for microorganisms leading to systemic infections. Nurses are the health care professionals responsible for recognizing alterations in oral hygiene status. Although a few oral assessment tools have been suggested, none have been studied to verify that they can be used by nurses to detect the necessary changes in oral hygiene status. The purpose of this study was to evaluate the use of oral assessment tools by staff nurses in a hemodialysis unit.

The investigator and two staff nurses from a dialysis unit collected data on the oral cavity conditions of 16 hemodialysis patients. Oral status was measured by the Bruya-

Madeira Guide for Assessment of the Mouth and the O'Leary Plaque Control Record. Demographic data was also collected. The time needed to teach the use of the two tools to the staff nurses and the time needed to actually use the two tools for patient evaluation was recorded.

Oral pathology was detected in 75% of the sample by the Bruya-Madeira tool and 100% by the O'Leary instrument. Calculus was visually noted in 69% of the patients which was not identified with either assessment tool. Thirty minutes were necessary to teach the use of the tools to the staff nurses, and a mean time of 10 minutes was needed for actual patient evaluation.

All patients in this study demonstrated oral pathology as measured by the O'Leary instrument. The necessity for routine nursing oral assessments is apparent. The two tools utilized appeared to be feasible for use by staff nurses. Modifications for the tools were recommended.