# Nursing Diagnosis of Drug Incompatibility: A Conceptual Process

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THERE IS currently an increased emphasis on nurses' accountability for their practice, and their role in decision making and diagnosis is becoming increasingly important. The "weak link" of nursing diagnosis, as described by Aspinall, must be strengthened if the quality of nursing care is to improve.[1] Henderson has defined nursing diagnosis as a statement of an actual or potential health problem that has an etiology or significantly related condition requiring nursing intervention for effective and predictable management.[2] Nursing diagnosis is based on a body of scientific knowledge which provides a systematic approach to assessing patients' problems and needs.

For a nursing diagnosis there must be: (1) patient assessment involving data collection; (2) analysis of data to identify a specific health problem; (3) a statement of conclusions derived from the assessment; and (4) a determination of etiology for the health problem that requires nursing intervention for effective and predictable

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management. Henderson noted that since the theory related to nursing practice is not at a level of predictability with proven causal relationships, etiology is primarily speculative, leading to the need for allowing flexibility in nursing diagnosis statements.[2]

The diagnosing of problems stemming from drug therapy is a frequent challenge for nurses in all health care settings. Both in nursing education and in nursing practice, drug-related problems are given less attention than is warranted by their frequency of occurrence. One reason for this is that the conceptual process for making such a diagnosis is less well defined in drug therapy than in many other areas.

## DIAGNOSING DRUG-RELATED PROBLEMS

Diagnosis and intervention related to the outcome of drug therapy are the domain of both nurses and physicians. Feinstein recognized prevention and alteration as "the actions of treatment."[3(p234)] Nurses now function independently in the area of prevention, but nursing practice causing alteration is usually a collaborative function with physicians.

When the etiology of a drug-related problem is linked to phenomena which nurses are educated and licensed to treat, the actual or potential health problem identified is a nursing diagnosis. A distinct nursing domain will evolve when research provides guidelines for predictable nursing management of the etiology of drug-related diagnoses. If etiology is unknown or is caused by phenomena in the areas in which physicians are educated and licensed to prescribe therapy, drug-related problems are in the medical or shared domain and physician collaboration is necessary.

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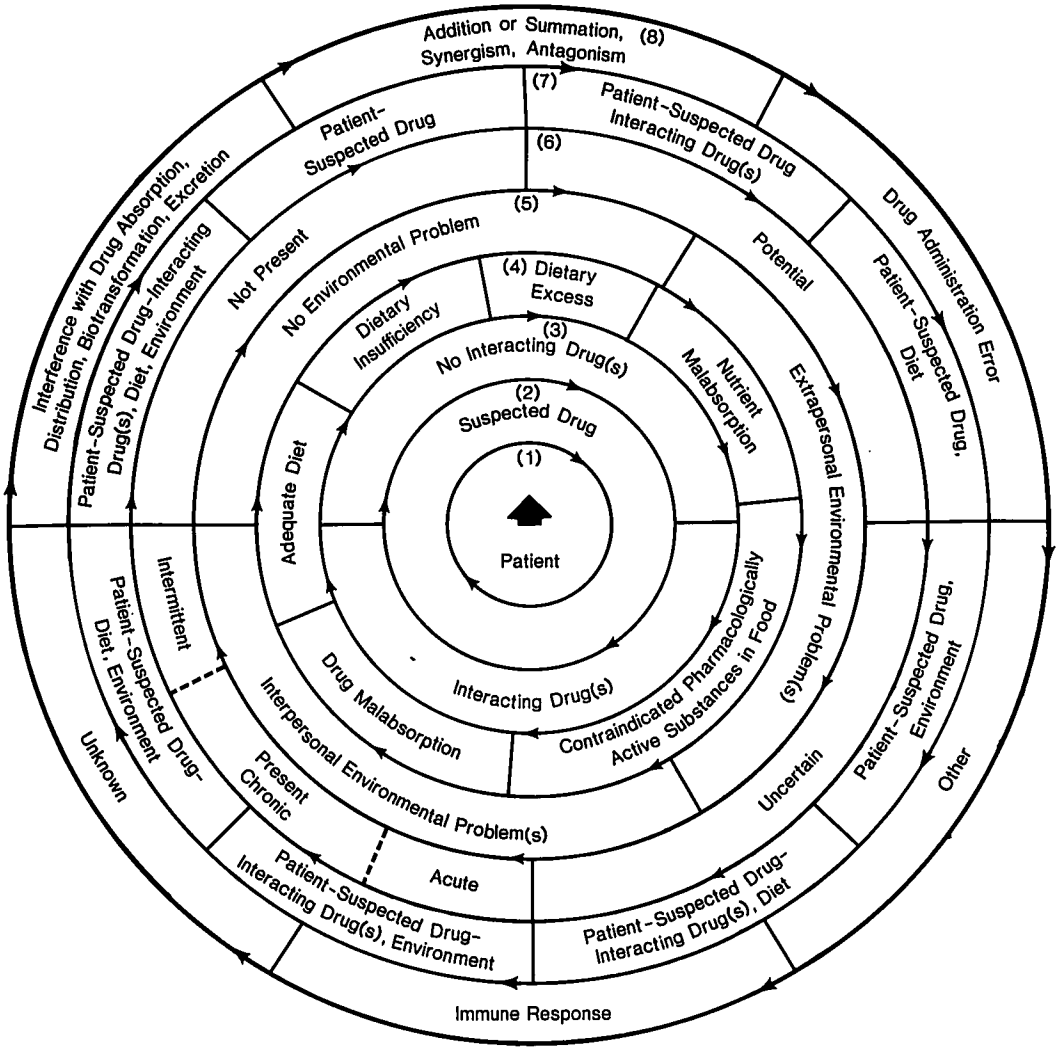
Although the domain of nursing practice is not well defined, nurses are concerned generally with the total person response to drug therapy, i.e., the effect of drugs on a person's functional capacity, the ability to perform activities of daily living. Nurses, moreover, analyze how their clients' functional capabilities, such as defects of sight, hearing, memory and mobility, may affect their following a prescribed drug regimen.

Within a general systems conceptual framework for nursing practice, adverse effects of drug therapy may be considered stressors which hinder a person's adaptive responses to maintain health. In evaluating outcomes of drug therapy by assessment of the response of disease conditions and body organs and systems, nurses in acute care settings are likely to continue to have a medical orientation. Since these nurses assist physicians in monitoring the effects of drug therapy, they need to be able to identify drug-related health problems outside the nursing domain. The conceptual process described here does not define a domain of nursing practice, but it can assist nursing practitioners in its development.

## IDENTIFYING THE VARIABLES

A study on clinical inference associated with drug therapy was recently conducted. In an attempt to delineate a conceptual process that could be used to diagnose drug-related problems, an inductive method was followed initially. The literature was reviewed for information on factors that had been identified as influencing patients' responses to drug therapy. Although drug literature primarily referred to drug-related problems as adverse drug action, effect, reaction or

**FIGURE 1. DRUG INCOMPATIBILITY DIAGNOSIS WHEEL**



interaction, the term *drug incompatibility* was adopted as a broader and more comprehensive idea encompassing multiple drug problems.

From the literature review on drug incompatibility, categories of information that must be collected to make a clinical judgment concerning the patient's drug-related problem were identified. Drug incompatibility was then defined as occurring when a drug adversely affects or fails to improve the health status of a patient because of its interaction with the patient and possibly any combination of the following variables: other drug(s), diet and/or the environment.

These selected categories of variables were next applied to cases from our past clinical practice in which a drug-related problem had been identified. From the nursing investigation of these patient situations, it was clear that a pattern of assessment parameters was emerging and giving direction to the diagnostic process. These parameters were seen as five variables on which data must be collected and analyzed to make a nursing diagnosis of drug incompatibility. They are: the patient, the suspected drug, drugs that may interact with the suspected drug, the patient's diet and the environment. These variables are represented in the first five rings of Figure 1, The Drug Incompatibility Diagnosis Wheel.

Finally, this systematic assessment approach for diagnosing problems of drug incompatibility was applied in the clinical area. Each of the five variables was further defined and was found to provide a helpful framework for making a diagnosis.

In addition to the five variables, other factors were established as important in the diagnostic process. These are depicted in the outer rings of Figure 1. A diagnosis not only gives a name to the patient's health problem, Feinstein pointed out, but it also guides the practitioner's thoughts chronologically backward to determine etiology and chronologically forward to predict prognosis and to choose therapy.[3(p73)] Occurrence and duration (Figure 1, Ring 6) are significant.

Exploring temporal concepts when a diagnosis is "present" will assist in making prognostic distinctions. Rings 7 and 8 deal with etiology. The interactional patterns which can be produced by combinations of the five variables are seen in the divisions of Ring 7. (See Table 1.) Prevention or breakup of unhealthful patterns is necessary in intervention. Several broad areas of etiology appear in Ring 8.

## THE DRUG INCOMPATIBILITY DIAGNOSIS WHEEL

After the literature review, it was felt that visual representation of interaction

**TABLE 1**
Interactional Patterns of Drug Incompatibility

1. Patient-Suspected Drug
2. Patient-Suspected Drug, Interacting Drug(s)
3. Patient-Suspected Drug, Diet
4. Patient-Suspected Drug, Environment
5. Patient-Suspected Drug, Interacting Drug(s), Diet
6. Patient-Suspected Drug, Interacting Drug(s), Environment
7. Patient-Suspected Drug, Diet, Environment
8. Patient-Suspected Drug, Interacting Drug(s), Diet, Environment

among the variables was desirable. The diagnosis wheel was constructed of eight concentric circles fastened in the center, each rotating independently of the others. This allows the user to align (above the arrow) information concerning the first five variables and knowledge of occurrence and etiology. The ordering of the rings and their divisions changed several times as we studied drug incompatibility.

## ESTABLISHING A DIAGNOSIS

If they are to diagnose drug-related problems, nurses need to understand the drugs their patients are taking. The undesirable effects of a specific drug—criteria for the diagnosis of drug incompatibility—are found in drug inserts, on labels and in current pharmacology books and professional journals. Deductive logic can be used to define adverse effects if the nurse is familiar with a drug's physiologic mode of action. Warnings concerning interacting drugs, dietary restrictions and environmental considerations also appear in drug literature.

Diagnosis of potential drug incompatibility involves familiarity with human and situational risk factors as well as drug contraindications, warnings and precautions. If the nurse is checking for failure to improve health status, the signs and symptoms labeled drug incompatibility may be those of a disease state, or they may be related to a person's functional capacity. Adverse effects of drug therapy can present as an alteration in health status that is not readily explained by the patient's disease state. Drug incompatibility may also cause signs and symptoms similar to those of the patient's disease, leading to diagnostic problems. At times, only drug withdrawal and patient observation make the diagnosis possible, but physicians must approve discontinuing prescribed medications.

Lack of consistent, generally accepted clinical criteria for inferring whether illness is a result of disease or of drug therapy is a major element in greatly restricting independent nursing practice to the area of prevention of drug-related problems. Hammon suggested two methods of reducing cognitive complexity and uncertainty when errors in inference would be dangerous: "1) obtaining greater theoretical knowledge grounded in fact concerning the system under observation, and 2) engineering the uncertainty out of the task by means of instrumentation."[4(p28)]

### *Assessing Health Status*

Since drug incompatibility occurs when drug therapy adversely affects or fails to improve the patient's health status, the assessment of health status is an integral part of diagnosis. The most appropriate process for determining the patient's health status involves obtaining a data base, analyzing the information and identifying the patient's actual or potential health problems.

Problems may be perceived by the patient and/or practitioner. A patient's history, including a drug history and physical assessment, form the data base. The drug history must consider over-the-counter drugs, home remedies and drugs prescribed by any physician who may be treating the patient. Sometimes medications of other family members are taken by the patient. Many patients are reluctant to

admit they are not following the physician's recommendations. As a result, questions related to compliance with drug therapy that are directed to the patient should be phrased "how often" instead of "do you" to avoid eliciting socially acceptable answers.

Additional information may need to be obtained from sources other than the patient. In our study, the content of drug history was specified by the data we deemed necessary for analysis of each of the five variables and determination of occurrence, duration and etiology.

The health problems that are identified from the data base need to be reviewed to decide if their origin is drug incompatibility or if they have the potential to cause future drug problems. The nurse's ability to diagnose drug incompatibility will only be as accurate as the information on which the diagnosis is based.

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*The Diagnostic Process—An Example*

Utilization of the framework identified for the diagnostic process is illustrated by the following synopsis of points pertinent to drug incompatibility from a hypothetical data base.

> Mrs. A, a 72-year-old widow, is thin, debilitated and has serious organic heart disease (patient variable). She does not know the basic side effects of her medication and is living on a poverty-level income (patient variable). She recognizes her medication by size and color, often taking incorrect dosages (suspected drug variable). She has nine different medications, two of which are unprescribed (interacting drug variable). Her diet is noticeably deficient in both iron and potassium, and all her medications are taken before meals (diet variable). Mrs. A lives alone and isolates herself except for grocery shopping and other necessary trips (interpersonal environmental variable). She often leaves the caps off her medication bottles because she has difficulty removing the child-proof caps herself (extrapersonal environmental variable).

A health status list of actual or potential health problems in this situation is: (1) organic heart disease, (2) undernutrition, (3) lack of knowledge concerning medications and medication regimen, (4) lack of adequate income and (5) recent social isolation.

Using the drug incompatibility framework, number 3, lack of knowledge concerning medications, is labeled drug incompatibility because all drug-related problems receive this designation. The specific interactional patterns are listed as subproblems A, B, C, etc. Other labeled numbers, however, are maintained unless they have no importance except their relationship to drug incompatibility. Information from other numbered problems and the drug part of the data base is analyzed and synthesized for decision making on the occurrence, interactional pattern(s) and specific etiology.

The preceding data base may lead to a diagnosis of potential drug incompatibility (interactional pattern of patient-suspected drug-interacting drugs-diet-environment) due to . . . (list here etiology in reference to the drug chosen as the suspected drug;

consider the factors and situations that benefit from nursing intervention as well as etiology in the medical and shared domains).

Appropriate nursing action would prevent the etiology since etiology is the focus of nursing intervention. The nurse could teach the patient about the names, proper dosages and actions of the drugs prescribed; the hazards of taking unprescribed drugs; and the dangers of an inadequate diet. The following steps may also be helpful: discussing possible involvement of the patient in a senior citizens' center which offers recreational activities and noon meals, consulting Mrs. A's physician concerning the necessity of continuing certain drugs which do not seem to be improving her health status, consulting social services about Mrs. A's home situation and eligibility for increased income benefits, and obtaining different containers for the various medications.

Until etiology within the nursing domain is less speculative, the accuracy of the nursing diagnosis of drug incompatibility can be shown by the success of the intervention.

Patients can be diagnosed as having more than one interactional pattern, but it is important to choose the pattern causing drug incompatibility which most clearly shows the complexity of the total situation for the suspected drug at the kind of occurrence decided upon by the nurse. If the diagnosis is an uncertain drug incompatibility owing to interaction of patient, digoxin, furosemide and a diet poor in potassium, then the correct pattern is a single one involving these four variables. It should not be broken up into several smaller variable patterns. When medication is adversely affecting a patient's health status due to its role as an interacting drug and when this is the only part it plays in drug incompatibility, the medication is not used as a suspected drug in another diagnosis.

In using the diagnosing process, a nurse is expected to examine the function of all the patient's medications in causation of health problems. If drug incompatibility is investigated and found not present, the nurse records this information as a dated entry in the proper section of the record system. Any change in drug therapy or health status should signal the need for another analysis.

## SELECTION OF THE CLINICAL PROJECT

To aid in development and validation of the construct of drug incompatibility, we chose to study persons taking digoxin or digitoxin in our clinical project. Although cardiac glycosides are potentially lethal, they are known to play a significant role in adverse drug reactions and are commonly used.[5] The nursing literature stresses the importance of identifying digitalis toxicity.[6,7]

Several unhealthful patterns of the variables we planned to use were well documented in relation to these drugs. The literature, however, did not list clinical criteria which unequivocally lead to a diagnosis of digitalis intoxication. Extracardiac signs and symptoms are known to be difficult to interpret because they occur in a wide variety of health problems. Cardiac signs may be seen in organic heart disease, making it difficult to determine whether the illness is caused by disease or digitalis therapy. This decision can be

aided by cardiac monitoring and determination of serum concentration of the cardiac glycoside; but nurses practicing in community or long-term care settings do not usually have the benefit of these diagnostic aids.

Inasmuch as ocular symptoms seemed to be more specific to intoxication with cardiac glycosides than confounding disease states, our project included testing persons taking digoxin and digitoxin with the Farnsworth-Munsell 100-Hue Test[8] to make observations concerning acquired color-vision deficiency. It was hoped that this type of instrumentation could aid in diagnosis of digitalis-induced drug incompatibility.

## THE KNOWLEDGE BASE FOR DIAGNOSIS

### *Patient Variable*

The center ring in Figure 1 represents the patient in whom the drug incompatibility is manifested. Some factors which can affect the development of drug incompatibility are age, genetic predisposition, body weight, disease states (especially renal and hepatic problems), body temperature, water and electrolyte balance, acid-base status, drug abuse, smoking, psychological problems (especially those leading to noncompliance with drug regimen), knowledge of drug regimen, financial status and cultural patterns.

For example, in examining the age factor, studies indicate that there is an increased incidence of adverse drug reactions in pediatric and geriatric patients. Melmon stated that the risk of a drug reaction in patients 60 to 70 years of age is almost double that of adults in the 30- to 40-year-old range.[9] Patient financial status plays an important role in that the amount of income or insurance benefits affects an individual's ability to purchase medications. This can determine whether a drug therapy program is carried out. Importantly, patients' understanding of their own health status and drug regimen, as well as their attitudes toward health and drug taking are reflected in the development of drug incompatibility.

An additional literature review identified information pertinent to diagnosis involving cardiac glycosides. Certain factors in the patient variable can increase or decrease a person's digitalis requirements. Smith and Haber stated that whether a patient manifests toxicity at any given digitalis dose is dependent upon such diverse elements as serum potassium, calcium and magnesium concentrations, the adequacy of tissue oxygenation, acid-base balance, thyroid status and autonomic-nervous system tone.[10] Renal and lung disease affect some of the above physiological states. The nature and severity of underlying heart disease is also a component in toxicity. Renal function is critical in digoxin therapy; liver function must be considered when digitoxin is involved. Older persons with decreased skeletal muscle mass and plasma water have higher serum concentrations of digoxin. The dose of digoxin should not be increased in markedly obese people, since digoxin is poorly soluble in fat.[11]

### *Suspected Drug Variable*

Information about the suspected drug is reviewed in the process of diagnosing drug incompatibility. (See Figure 1, Ring 2.)

***Information about a potential problem-causing drug should be reviewed in the process of diagnosing drug incompatibility.***

Some areas that should be considered here are drug action, dosage, indication or use, form of medication, route of administration, tolerance, warnings, contraindications, precautions, signs of drug toxicity and overdosage treatment. All this information is available to the nurse in reference books, such as the *Physician's Desk Reference,* which should be consulted relative to each of the patient's medications. Ogilvie and Ruedy found that most adverse patient-drug reactions were dose related and predictable.[12]

There is great variation among nurses in their knowledge of digoxin and digitoxin. Coronary care unit nurses deal with this information frequently, enabling them to diagnose drug incompatibility quicker and with greater accuracy than other staff nurses. Cardiac monitoring gives them a better data base from which to make the diagnosis of toxicity. Although the exact mechanism of the action of digitalis in therapeutic and toxic doses is still disputed, the nurse will benefit a great deal from studying literature that discusses digitalis absorption, distribution, biotransformation, action and excretion. Thus greater theoretical knowledge will be gained.

*Interacting Drug(s) Variable*

The same factors that were reviewed in the suspected drug variable (e.g., drug action, dosage, indication or use) should be analyzed again with each interacting drug (See Figure 1, Ring 3.) For most drugs, the greater the dose of an agent that has a potential to interact, the greater the intensity of the interaction that develops.

Hussar used as an example the fact that small doses of sodium bicarbonate are not likely to change urinary pH signficantly, but larger doses may sufficiently alkalinize the urine to influence the activity of other drugs also being administered.[13] The source of drug-drug interaction will probably be derived from a combination of the drugs' actions or effects; or from alteration of absorption, distribution, biotransformation or excretion of one drug by another.

The sequence of administration, the duration of therapy and the number of drugs the patient is taking are additional factors to be taken into account when considering interacting drugs. Avoidance of adverse interaction is aided by keeping the use of concurrent medications and drug mixtures (a medication containing more than one drug) to a minimum. It has been found that error making by patients is significantly related to the number of prescribed medications. Persons taking three or more drugs are more likely to make medication errors which could lead to drug incompatibility.

Several well-known interactions with the cardiac glycosides involve: calcium preparations, diuretics (potassium-losing), drugs that increase or decrease gastrointestinal mobility, and sympathomimeties. Neomycin, kaolin and pectin, and nonabsorbable antacids interfere with digoxin absorption.[11]

*Diet Variable*

The patient's diet is the fourth variable that should be reviewed. (See Figure 1, Ring 4.) Information about the patient's dietary habits, the taking of medications in relation to meals, and the food or fluid used in taking medications is obtained in the data base. When it is known that certain vitamins, minerals or electrolytes are involved in drug incompatibility with the suspected drug, the patient's dietary status in relation to these factors must also be determined.

Lambert[15] and Lamy and Blake[16] have provided good discussions of the diet variable. We divided the relationship between diet and drugs into five general categories: nutrient malabsorption, drug malabsorption, contraindicated pharmacologically active substances in foods, dietary excess and dietary insufficiency.

People taking potassium-losing diuretics with their digoxin or digitoxin need to increase the potassium in their diet because of the risk of digitalis toxicity when hypokalemia is present. Excessive licorice ingestion is another factor causing hypokalemia. Marcus reported that taking digoxin tablets after food does not appear to alter steady-state serum digoxin levels.[11]

*Environmental Variable*

It appears that less is known about the fifth interacting variable—environment—than about the aforementioned variables. (See Figure 1, Ring 5.) The environmental factors are those that arise from the interpersonal and extrapersonal aspects of the individual's surroundings. The interpersonal factors within the environment combine in interaction with the patient. The extrapersonal factors may affect the patient, the drug or both.

Schwartz et al. found a relationship between the patients' abilities to cope with their individual environments and their tendencies to make medication errors.[17] Among patients who were rated as "coping well" with their environment, 56% made some sort of error and only 19% made potentially serious errors. On the other hand, 71% of the patients "barely coping" with their environment were found to make medication errors and as many as 59% were found to be making potentially serious errors.

Some research supports the importance of interpersonal factors in influencing the outcome of drug therapy. Sheard reported that the physician's attitudes and general expectations regarding the effectiveness of drugs prescribed for patients were positively correlated with patient response to antidepressant medication.[18]

Patient preference for a strict or authoritarian physician was found to be significantly correlated with following a prescribed regimen of diabetes control.[19] Mothers who stated that the physician did not seem friendly had a significant reduction in compliance compared to other mothers in the study by Francis et al.[20] Therefore, friendliness or warmth on the part of the physician, as perceived by the patient, did not in itself result in increased compliance. Studies need to be carried out to determine the extent to which nurse-patient interaction influences adherence of patients to prescribed drug regimens.

Household composition and availability of a significant person are important considerations in patient assessment when

a person has motor, sensory or memory defects. Schwartz et al.[17] found that when patients lived alone a significantly different proportion of error makers was observed, but Neely and Patrick[14] did not confirm this finding. One study reported that men who are married tend to follow prescribed regimens better than those living alone.[21]

Finally, information regarding the variety of health resources used by a patient is important in the diagnosis of drug incompatibility since the patient can be taking medications prescribed by more than one physician for the same illness.

The extrapersonal part of the human environment can also play a part in drug incompatibility. Certain drugs lose their potency or undergo chemical alteration from a variety of environmental sources. Examples are lack of refrigeration, exposure to air or exposure to sunlight. Problems may develop if any of the following occur: drugs are removed from their original labeled bottles, drugs are mixed together in the same container, or a patient's drugs are not kept separate from those of other family members. Thus the storage of drugs becomes an important factor to be considered.

Another example falling within this variable is climate. The climate in which a person lives can affect drug actions. The effects of drug therapy in tropical zones, for example, vary from those in frigid zones or high-altitude areas.

Brown et al. found that a larger number of p.r.n. drugs were ordered for residents in rural nursing homes compared with patients in urban long-term care facilities.[22] When qualified nursing personnel are lacking, a potentially dangerous situation could exist for the rural residents. Individuals whose occupations necessitate intensive exposure to DDT may experience an increase in liver enzymes, causing a rise in the rate at which some drugs are metabolized.[13]

Drug legislation is also categorized as an extrapersonal environmental factor. Federal and state laws regulate standards for the labeling of drugs, drug packaging, refill requirement, the purity and composition of drugs and the public's access to drugs. These standards may influence medication errors and drug abuse.

*Occurrence*

The occurrence of drug incompatibility derived from a particular pattern of variables (see Table 1) can be identified as: (1) present, (2) not present, (3) uncertain or (4) potential. (See Figure 1, Ring 6.) Drug incompatibility is "present" when the combination of variables adversely affects or fails to improve the patient's health status. Prognosis may vary depending upon whether the occurrence is acute, chronic or intermittent. Identification of failure to improve health status can be enhanced if nurses and physicians carefully define the therapeutic end point of treatment. Drug incompatibility is "not present" when all the variables are interacting to maintain or improve the health status of the patient.

***Identification of failure to improve health status can be enhanced if nurses and physicians carefully define the therapeutic end point of treatment.***

A diagnosis is considered "uncertain"

when factors seem to point to drug incompatibility but data to make it conclusive are not present. For example, when signs and symptoms of a disease are the same as the signs and symptoms of drug toxicity, the diagnosis should be classified as uncertain. A "potential" diagnosis occurs when the nurse identifies factors which indicate the possibility of drug incompatibility developing at some future time. Recognizing potential forms of drug incompatibility is very important in discharge planning.

Generally, the nurse needs to be alert for needless drug therapy as well as drug therapy which harms the patient or renders a concurrent drug useless. Nursing intervention, independent or collaborative with a physician, is always necessary unless the nurse is certain that drug incompatibility, including its potential forms, is not present.

*Etiology*

The last area of concern involves knowledge of the etiology of drug incompatibility. (See Figure 1, Rings 7 and 8.) Although identification of the interactional patterns leading to drug incompatibility is a gross form of determining etiology, more specific causation can be established in many cases. Six categories have been entered in Ring 8: (1) interference with drug absorption, distribution, biotransformation and excretion; (2) addition or summation, synergism and antagonism; (3) drug administration error (patient or caretaker); (4) immune response; (5) other and (6) unknown.

The first two of these categories are discussed in Goodman and Gilman.[23] The third category, i.e., error, can be caused by either patients or their caretakers (professional and nonprofessional). The error can be described as occurring when the correct dose of the right drug is not given to the right person at the right time, by the right route, using the correct technique. With respect to category 4, different types of immunological response are explained in Beland and Passos.[6] Drug allergies should be viewed as permanent, active health problems. Persons with drug allergies will always have a diagnosis of drug incompatibility.

With respect to category 5, if the etiology is known but the causation does not fit into the previous categories, it is classified, by the use of the wheel, as "other." Health records, however, would show the specific cause. Category 6—unknown factors—includes etiologies not known because of a lack of research evidence or because of a deficiency in the nurse's knowledge. In cases of multiple etiology, a nurse utilizing the Drug Incompatibility Diagnosis Wheel will have to readjust the outer ring for proper alignment of etiologic factors with the interactional pattern identified above the arrow.

## THE CLINICAL PROJECT

The subjects to be assessed for drug incompatibility were selected by acquiring names and room numbers of persons taking cardiac glycosides who had serum levels checked in the laboratory of a large city/county hospital associated with a medical school. Although validation of the process was done in an acute-care setting where ECG and laboratory data

were available, our data base excluded this current information because it is not readily obtained by nurses in many care settings. Results of ECG data prior to admission were examined to gain knowledge concerning past cardiac status. Initially, since a comprehensive history and physical examination were already recorded on the charts, the only item needed was a more detailed drug history procured from subjects.

Because of our special interest in digitalis intoxication, an observation flow sheet which clustered gastrointestinal, neurological and cardiac signs and symptoms was used on the first visit and on revisits to collect data concerning the appearance and extinction of digitalis toxicity. Each nondimensional characteristic of intoxication on the list was discussed by our group to arrive at a consensus on the meaning of the word. Joint observation and record review were made on several occasions to test the reliability of our assessments.

It is interesting that different hospital personnel charted conflicting reports concerning a patient's health status, especially in the area of subjective symptoms. Patients were not always consistent in the discussion of their symptoms. Difficulty securing equipment limited color-vision testing to six subjects.

Analysis of information followed data collection. We realized that our short visits in an acute-care setting were often not long enough to get a true picture of the characteristics of drug incompatibility. The person who really would have been able to give the most reliable report was the unit nurse. It is the unit nurse, as a rule, who has enough contact with the patient to make careful observations on changes in health status over a period of time. Factors related to development of drug incompatibility were easier to identify than signs and symptoms of toxicity. Congestive heart failure, multiple medical diagnoses, bowel preparation for x-rays, sleeping pills and tranquilizers often confounded inferences regarding the presence of drug incompatibility resulting from toxicity.

Eighteen persons were studied during the clinical project, resulting in the following: (1) three were too ill to give adequate information for making any diagnosis; (2) two were given only the vision test; (3) one was diagnosed as "drug incompatibility not present" and (4) 12 were given 27 diagnoses of drug incompatibility either "potential" (17) or "uncertain" (ten) resulting from one or more of the eight interactional patterns. (See Table 1.) Drug incompatibility was not diagnosed as "present" in any of the subjects, but some of the uncertain patterns could have been regarded as present with the addition of laboratory and ECG data.

Twenty of the diagnosed interactional patterns were numbers 1 and 2 in Table 1, and half these occurrences were labeled as uncertain. The potential form of number 4 was identified four times. No diagnoses involved numbers 3, 6 and 7.

The large number of uncertain occurrences verifies the current major limitation of independent nursing practice in the area of prevention of drug-related health problems. Since the occurrence of drug incompatibility was determined mainly as potential, it signalled the need for nursing

research to identify causation in the nursing domain, which is not speculative, and to develop predictable results from nursing intervention aimed at preventing the etiology.

As a result of the small number of persons who had color-vision testing, the value of this information in diagnosis of drug incompatibility involving cardiac glycosides could not be evaluated. Test-retest results of a woman with digitoxin toxicity demonstrated that she had an acquired color-vision deficiency.

The clinical study using the drug incompatibility diagnostic framework showed that many of the potential occurrences had etiology within the nursing domain. All drug incompatibility problems identified could be accounted for by one of the eight interactional patterns of the five variables.

***A clinical study using the drug incompatibility diagnostic framework showed that many potential drug-related occurrences have etiology within the nursing domain.***

## NURSING'S RESPONSIBILITY

Nurses share the responsibility for monitoring drug actions and interactions. They can meet this responsibility by using the framework for diagnosing drug incompatibility discussed above. This framework for diagnosis needs further validation through application in the clinical area.

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