Analysis of the cancer nursing service in the Nassau County (N. Y.) Department of Health suggests criteria that may be useful to other health departments in appraising a cancer nursing program or as goals to strive for in such a program.

Appraising Cancer Nursing Services

—*A Study to Establish Criteria*—

By E. DOROTHY GORDON, R.N., B.S., VINCENT H. HANDY, M.D., M.P.H., FRANCES TITUS, R.N., and EARLE G. BROWN, M.D.

CANCER as a disease has long been known to mankind. Only comparatively recently, however, has cancer been generally recognized as a public health problem. In New York State, as in the Nation, cancer now ranks second only to heart disease as a cause of death. In 1953, cancer had an incidence of 281.3 reported cases per 100,000 population and a death rate of 170.4 per 100,000 population in New York State, exclusive of New York City. In view of the size and seriousness of this public health problem, the New York State Department of Health's bureau of cancer control has consistently encouraged local departments of health to develop progressive, integrated programs of cancer control, including public health nursing services.

Nursing has always had a significant contribution to make to the care of patients with cancer, and public health nursing is peculiarly fitted to play an important role in modern-day cancer control. Public health nursing services can be expected to assume an even greater importance in cancer control programs as public health agencies give increasing attention to all the chronic diseases.

If local health departments are to develop cancer nursing services in an orderly manner, periodic, systematic appraisal of the programs is necessary. For such an appraisal, some criteria by which the programs can be measured to indicate achievements and uncover areas for further development would seem to be required. Therefore, during 1952 and 1953, the New York State Health Department's bureau of cancer control and the Nassau County (N. Y.) Department of Health undertook a study aimed at establishing criteria that could be used in appraising cancer nursing services.

The approach to the problem consisted in an attempt to find out what the essential elements of cancer nursing are as carried out in a specific area, with reference to the following questions:

1. What type of cancer patient is receiving home nursing care?
2. What is the extent of nursing care being given to the patient?
3. Can this information suggest criteria for appraising a cancer nursing program?

Miss Gordon and Dr. Handy are with the bureau of cancer control, New York State Department of Health, Albany. They are, respectively, consultant nurse and assistant director. Miss Titus is assistant director of public health nursing, Nassau County Department of Health, Garden City, N. Y., and Dr. Brown is the Nassau County commissioner of health.

Study Methods

Nassau County was selected as the area for study for several well-defined reasons.

First, it has an active, well-organized health department.

Second, the health unit has not only an active caseload of nursing visits to cancer patients, but also a sufficient number of patients and visits for valid conclusions to be drawn.

Third, its nursing records are reasonably complete and are readily available for study.

Fourth, in addition to a public health nursing service, other community resources, including hospital, clinic, and ancillary services, are available within or close to the area for assistance in the total care and rehabilitation of cancer patients.

Finally, diagnostic reports are accessible and completely reliable. It was agreed early in the planning period of the study that only those patients for whom a diagnosis of cancer had been made and reported to the health department prior to referral for nursing service would be included. This decision eliminated study of one of the nurse's most valuable contributions to the cancer control program, that is, followup of the "suspected" case until cancer is diagnosed or ruled out. However, it was felt that for the primary purpose of this study, only diagnosed cancer patients should be included, in the interests of accuracy and reliability of the data.

In addition to meeting these general requirements, Nassau County has three specific characteristics which make it an appropriate locale for the study.

First, there is sustained professional and public interest in cancer, as shown by the formation in 1928 of the Nassau County Cancer Committee, and later the appointment of a health educator to its staff, and by the establishment of a tumor clinic in the county hospital in 1932.

Second, the public health nursing service of the Nassau County Health Department reaches a large percentage of reported cancer cases. Since its inception in 1938, the nursing service has been generalized, with each staff nurse giving service to any person in her area referred for health supervision and nursing care in the home. In 1940, it became apparent that the nurses needed more specialized knowledge of cancer, and a comprehensive inservice education program was started. This program has been continued regularly since that date.

Third, the county health commissioner possesses a firm conviction that cancer nursing is an integral part of and a legitimate function of a comprehensive, generalized public health nursing service, and that as emphasis in public health shifts toward the chronic diseases, the same trend should occur in public health nursing. He and his staff have worked steadily and imaginatively to create and develop good rapport between the county health department, the county cancer committee, and local practicing physicians.

The success of the Nassau County Health Department's approach is reflected in the referrals of cancer patients to the public health nursing service. During the period July 1, 1952, to June 30, 1953, 488 new cancer patients received nursing service out of 1,599 cases in the county reported before death, a percentage of 30.5. The average for upstate New York was 14.1 percent, exclusive of patients receiving care from visiting nurse associations.

The proportion of cancer patients to the total number of patients receiving nursing services is even more interesting. During the same 12 months, the Nassau County Health Department provided nursing services for 21,833 patients. Of these, 626, 2.8 percent, were cancer patients (including both new patients and those readmitted to service). In the rest of New York State, exclusive of New York City, 737 cancer patients received nursing care from the official agencies out of 83,587 patients carried for all nursing services, a percentage of 0.8. The difference between the makeup of the nursing load in Nassau County and that of the rest of the upstate area is statistically significant.

The time period selected for the study was July 1, 1952, through September 30, 1953. One hundred thirty-six new cancer patients consecutively admitted to nursing service during the first 12 months of that period composed the study population. Some difficulty was experienced in accumulating this number of patients for study because frequently patients were referred for nursing service before a definite diagnosis was made. Only those patients for whom a definite diagnosis of cancer had been made

Worksheet Used for Recording Data

Village or city:	County:	Name:	Diagnosis:

Age:	Sex:	Date referred to nurs. serv.:	Date first visit by nurse:	Total visits:

Referred by:
Hospital ☐ Private physician ☐ Other agency ☐
Family or friend ☐ Self ☐

Referred for:

Classification:	Stage:	Status:	Date	Disposition of case:	Date
Surgical ☐	Early ☐	Ambulatory ☐	_____	Died ☐	_____
Nonsurgical ☐	Late ☐	Part-time ambulatory ☐	_____	Discharged to hospital ☐	_____
Radiation ☐		Bedridden ☐	_____	family ☐	_____
				other ☐	_____
				Active ☐	_____

NURSING SERVICES

Physical Care	Given by Nurse	Dem. to Pt.	Dem. to Fam.	Supervised
General care (full or partial)				
Dressings				
Enema				
Irrigations				
Diet and special feedings				
Injections				
Rehabilitation procedures				
Sitz bath				
Surgical assistance to doctor				
Tracheotomy, laryngectomy care				
Tube feeding (nasal, gastric)				
Vaginal douche				
Other (specify)				

Supportive Care	Dir. to Pt.	Dir. to Fam.
Motivate to medical care		
General health instruction (nutrition, etc.)		
Referral to other agencies		
Followup nursing supervision		
Emotional support		
Assistance with special problems		
Other (specify)		

and reported to the health department prior to referral for nursing service were included in the study group.

The nursing service for each patient was studied for 3 months, unless the patient died or was discharged earlier. A worksheet, shown above, was devised for recording the desired data and was completed for each patient in the study. The data were obtained almost exclusively from the nurses' records; interviews with nurses for the collection or supplementation of data were kept to a minimum.

Sex Distribution and Leading Sites

The sex distribution of the patients in the study favored females. Eighty-one, 59.5 percent, were females, and 55, 40.5 percent, were males. The distribution of all reported cancer cases in Nassau County in 1953 was more nearly equal; 48.3 percent of the cases were in males, and 51.7 percent were in females. It may be that more women than men received nursing service because the site of the cancer and the special needs of patients having cancer of cer-

Table 1. Distribution of nursing care patients according to site of cancer

Site	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
Intestine	11	20. 0	17	20. 9	28	20. 6
Breast	0	0	20	24. 7	20	14. 7
Rectum-anus	7	12. 7	8	9. 9	15	11. 0
Respiratory system	11	20. 0	0	0	11	8. 1
Skin	7	12. 7	0	0	7	5. 1
Cervix	0	0	6	7. 4	6	4. 4
Stomach	0	0	5	6. 2	5	3. 7
Prostate	5	9. 1	0	0	5	3. 7
All others	14	25. 5	25	30. 9	39	28. 7
Total	55	100. 0	81	100. 0	136	100. 0

tain sites determine which patients are referred for nursing care.

Cancer of every system and of most anatomical sites was represented in the study group. As shown in table 1, 5 sites accounted for about 60 percent of the nursing caseload: intestine, breast, rectum-anus, respiratory system, and skin. In Nassau County in 1953, the respiratory system and the intestine were the second and third most frequent sites of cancer among males, exceeded only by the skin; and the breast was the leading site of cancer among females. In the study group, patients with cancer of the intestine and those with respiratory cancer were the most numerous among the men, and patients with breast cancer were the most numerous among the women. These data indicate that the distribution of nursing care patients by site of the cancer tends to follow the distribution of all reported cancer patients.

Physical Care Services

Of 1,290 physical care services given, the women received 935 (72.4 percent), nearly 3 times as many services as the men. As previously stated, there were only about 1½ times as many women as men in the study group. One possible explanation for the preponderance of physical care services being given to the women is that the site of the cancer dictates the amount and kind of physical nursing care necessary. The data in table 2 tend to support this view.

Cancer of the respiratory system, one of the leading sites among the men, received only 3.8 physical care services per patient. This may be because of the limits to home nursing care imposed by cancer of this site. In general, the course of lung cancer, as compared with cancer of other sites, is of relatively short duration. Much of the treatment is given in the hospital, and upon discharge the patient may have little need of physical nursing care services.

On the other hand, cancer of the breast, the leading site among the women, may require a number of physical care services, such as dressings and rehabilitation procedures, to be given

Table 2. Number of physical care services according to site of cancer

Site, by sex	Number of patients	Number of services	Number of services per patient
Males			
Respiratory system	11	42	3. 8
Intestine	11	147	13. 4
Rectum-anus	7	28	4. 0
Skin	7	29	4. 1
Prostate	5	60	12. 0
All others	14	49	3. 6
Total	55	355	6. 4
Females			
Breast	20	252	12. 6
Intestine	17	237	13. 9
Rectum-anus	8	73	9. 1
Cervix	6	31	5. 1
Stomach	5	52	10. 4
All others	25	290	11. 6
Total	81	935	11. 5

Table 3. Number and percentage of physical care services

Service	Services for males		Services for females		Total services	
	Number	Percent	Number	Percent	Number	Percent
General care	90	25. 3	197	21. 1	287	22. 2
Dressings	88	24. 8	190	20. 3	278	21. 6
Irrigations	48	13. 6	220	23. 6	268	20. 8
Injections	60	16. 9	187	20. 0	247	19. 1
Enemas	46	12. 9	76	8. 1	122	9. 5
All others	23	6. 5	65	6. 9	88	6. 8
Total	355	100. 0	935	100. 0	1, 290	100. 0

in the home. Breast cancer received 12.6 physical care services per patient, next to the highest number of services given to the women.

Considering all women patients and all men patients, however, we find that the women required an average of 11.5 physical care services as compared with 6.4 for the men. Possibly the reason for this difference lies in factors not revealed by the data collected for this study.

Table 3 shows that 5 types of service accounted for 93 percent of all physical care services given: general care, dressings, irrigations, injections, and enemas. For the men, general care was given most often; for the women, irrigations were most common. It should be noted here that one elderly woman in the group received an unusually large number of irrigations given by the nurse because it was not possible for a member of the family to assume complete responsibility. In this relatively small group studied over such a short period of time as 3 months, it is possible that 1 or 2 patients may influence the statistical picture to a disproportionate degree.

Supportive Care Services

It is difficult to make a division between physical care services and supportive care services in evaluating total nursing services. For the purpose of collecting and analyzing the data, an attempt was made in this study to make such a division, but for interpreting the data it is necessary to bear in mind certain intangible factors that operate significantly in good nursing care. For example, it is hard to imagine a good nursing visit made for the purpose of giving a bath or doing a dressing that does not also include some awareness by the nurse of the patient as a person, with his emotional needs and responses peculiar to himself at that time.

Table 4. Distribution of supportive care services according to site of cancer

Site, by sex	Number of patients	Number of services	Number of services per patient
Males			
Respiratory system	11	19	1. 7
Intestine	11	37	3. 4
Rectum-anus	7	16	2. 3
Skin	7	14	2. 0
Prostate	5	4	. 8
All others	14	44	3. 1
Total	55	134	2. 4
Females			
Breast	20	32	1. 6
Intestine	17	51	3. 0
Rectum-anus	8	22	2. 8
Cervix	6	14	2. 3
Stomach	5	12	2. 4
All others	25	92	3. 6
Total	81	223	2. 7

Of 357 supportive care services given, women received 223 (62.5 percent), and men, 134 (37.5 percent). This follows fairly closely the sex distribution of the study group.

Table 4 shows that there was little difference between the sexes when the distribution of supportive care services by site was studied. The men averaged 2.4 supportive care services; the women, 2.7. As with physical care services, the number of supportive care services per pa-

Table 5. Number and percentage of supportive care services

Service	Services for males		Services for females		Total services	
	Number	Percent	Number	Percent	Number	Percent
Emotional support	49	36. 5	81	36. 3	130	36. 4
General health instruction	39	29. 1	55	24. 7	94	26. 3
Assistance with special problems	21	15. 7	39	17. 5	60	16. 9
All others [1]	25	18. 7	48	21. 5	73	20. 4
Total	134	100. 0	223	100. 0	357	100. 0

[1] Includes motivation to medical care, referral to other agencies, followup nursing supervision, and other services.

tient tended to be more affected by site of the cancer than by sex of the patient. Cancer of the intestine, for example, required the most supportive care, regardless of the sex of the patient.

According to tables 2 and 4, approximately 3½ times as much nursing service was devoted to the physical care of the patient as to his supportive care. As previously noted, however, it is next to impossible to divorce physical care from supportive care. It is very probable, therefore, that more supportive care was given than would be indicated by the nurses' records. Good nursing care includes recognizing and attempting to meet the emotional needs of the patient as well as the physical needs. But so much of supportive care is incidental, if not perhaps unconscious, that nurses usually do not record it. This is unfortunate since the public health nurse is especially trained to assist in those services listed as supportive. Unless it is clearly understood and accepted that this service is an important and integral part of her function, many persons may be led to assume that physical care services alone constitute an adequate nursing visit and that the visit can thus be made by someone with less formal training. For the maximum service to the patient, complete nursing care must include both physical and supportive care to the degree indicated by the needs of the patient.

The most interesting finding revealed by table 5 is that three general types of supportive service—emotional support, general health instruction, and assistance with special problems—comprised approximately 80 percent of all supportive services. Furthermore, with minor deviations, these three types were about equally distributed among men and women.

Table 6. Number and percentage of nursing care services according to specified classifications

Service	Services for males		Services for females	
	Number	Percent	Number	Percent
Physical care				
Given by nurse	286	80. 5	820	87. 7
Demonstrated to patient or family	39	11. 0	67	7. 2
Supervised	30	8. 5	48	5. 1
Total	355	100. 0	935	100. 0
Supportive care				
Directed to patient	76	56. 7	156	69. 9
Directed to family	58	43. 3	67	30. 1
Total	134	100. 0	223	100. 0

Extent of Nursing Care

One measure of the extent of nursing care was obtained by tabulating physical care services according to three classifications as shown in table 6: services given by the nurse, which included care given to the patient in which demonstration or teaching was incidental rather than a primary objective; services demonstrated to the patient or family, which included care given by the nurse to show how to do a procedure, the eventual goal being to have the patient or his family assume this responsibility; and services supervised, which included the nurse's visit to observe a procedure, answer

questions, and evaluate the situation after the patient or family had assumed responsibility for care.

A large percentage of the physical care services were actually administered by the nurse, and only a small percentage were demonstrated to the patient or family. Although this was true for both men and women, a higher percentage of services were demonstrated for the men than for the women. One explanation for this difference might be that a wife is more likely to assume nursing duties when her husband is ill than is a husband when his wife is ill. It was also found that a large proportion of the study group were in the late stage of the disease. Nearly a third of the patients died within 3 months after admission to nursing service. It can probably be assumed that a great many of the patients were already too ill and the family already too exhausted physically and emotionally for anyone but the professional nurse to undertake the patient's care.

"Services supervised" should be one indication of the patient's or family's degree of success in achieving self-sufficiency. The nurse was satisfied that self-sufficiency had been attained in 8.5 percent of the physical care services for men and in 5.1 percent for women.

Table 6 also shows a tabulation of supportive care services according to services directed to the patient and services directed to the family. More of the services fell into the first category than the second for both men and women. This finding may be a demonstration of a desirable principle of nursing care, that is, help the patient to help himself first and thus aid him in establishing independence and security.

The women patients received a higher percentage of supportive care services directed to themselves (69.9 percent) than did the men (56.7 percent). It may be that in many instances other members of the family were at places of employment outside the home at the time of the nurse's visit. However, it was the exceptional patient who lived alone.

Age, Referrals, and Disposition

The men in the study group tended to be older than the women, with 92.8 percent of the men over 45 years of age compared with 77.8 percent of the women. However, the number of visits per patient was higher in each age group for women than for men. The greatest number of visits per patient occurred in the 25–34 age group for women, but there were very few patients in this group. The data on age and number of visits are shown in table 7.

As shown in table 8, 88 patients (65 percent) were visited by the public health nurse on the day of referral, and 104 (76.4 percent), within 2 days. Seventeen patients (12.5 percent) were not visited until the ninth day or later. A local situation in the county may have some bearing on this last finding. Fourteen of these seventeen patients were referred by the local hospital, which has a tumor clinic. All patients attending the clinic are referred to the health department nursing service for followup or because of missed clinic appointments. The

Table 7. Age distribution of patients and number of nursing visits

Age, in years	Males				Females			
	Number of patients	Percent	Number of visits	Visits per patient	Number of patients	Percent	Number of visits	Visits per patient
Under 24	2	3. 6	5	2. 5	1	1. 2	13	13. 0
25–34	0	0	0	0	3	3. 7	43	14. 3
35–44	2	3. 6	9	4. 5	14	17. 3	168	12. 0
45–54	6	10. 9	24	4. 0	12	14. 9	89	7. 4
55–64	23	41. 9	216	9. 4	21	25. 9	266	12. 7
65–74	11	20. 0	89	8. 1	15	18. 5	183	12. 2
75 and over	11	20. 0	50	4. 6	15	18. 5	163	10. 9
Total	55	100. 0	393	7. 1	81	100. 0	925	11. 4

Table 8. Time interval between referral and first nursing visit according to source of referral

Source of referral	Time interval				Total	
	Same day	2 days	3–8 days	9 or more days	Number	Percent
Private physician	51	10	8	3	72	52.9
Hospital	28	2	6	14	50	36.8
Other	9	4	1	0	14	10.3
Total	88	16	15	17	136	100.0

patient's clinic return date may be a considerable time after the date referral to the nursing service is made, and these referrals receive no priority in the public health nurse's schedule. Therefore, the nurse may delay her first visit until near the time of the patient's clinic appointment. If immediate nursing were needed, the referral notice would so indicate. With the exception of these 17 patients, the time interval between referral and first nursing visit was fairly consistent for the various sources of referral.

Table 8 also gives the number and percentage of patients referred by each source. Of the 72 patients (nearly 53 percent) referred by private physicians, 46 were women and 26 were men, a male to female ratio slightly more in favor of women than the sex distribution of the study group. Of the 50 patients (36 percent) referred by the hospital, women numbered 26, and men, 24. Other sources, which accounted for only 14 of the patients, included self or family.

A striking fact revealed in table 9 is that, of the 135 patients for whom the stage of disease was known, 121 (89.7 percent) were in the late stage when diagnosed. Only 14 (10.3 percent) were in the early stage. In 1953, Nassau County reported 1,900 new cancer cases. The physician designated the stage of disease at time of diagnosis in 1,603 of these. Of this group, 334 (20.8 percent) were cases in the early stage of disease.

The fact that a preponderance of the cases referred for nursing service were late cases may have significant implications for nursing. If we believe nursing as well as medicine can make its maximum contribution to the welfare of the patient during the early stage of a disease, then obviously the opportunity diminishes as the disease progresses. But physicians may feel that the patient should be maintained without nursing supervision in the home until the late or even terminal stage has been reached. Table 9 shows that 42 patients (30.9 percent) died within 3 months after referral (the period of study of each patient), a finding that appears to lend support to this theory. Possibly physicians do not wish some patients to know or even suspect the diagnosis of cancer and feel that referral for nursing care early in the course of the disease might arouse the patient's anxieties. Or perhaps patients are referred for health department nursing care only after the family has exhausted its own resources, both physical and emotional.

Table 9 also reveals that 37 patients, 27.2 percent, were discharged to themselves or their families. It may be inferred that these patients had achieved enough self-sufficiency to be responsible for their own followup, subject,

Table 9. Disposition of patients by stage of disease at time of diagnosis

Disposition	Stage of disease [1]		Total	
	Early	Late	Number	Percent
Died	1	41	42	30.9
Discharged to hospital	3	11	14	10.3
Discharged to self	4	16	20	14.6
Discharged to family	2	15	17	12.5
Discharged to private duty nursing	0	2	2	1.5
Active	4	36	41	30.2
Total	14	121	136	100.0

[1] Stage of disease unknown for one patient.

of course, to regular medical supervision. If those patients who died are excluded from the calculations, then the percentage of patients who achieved self-sufficiency is 39.4. This finding is especially gratifying since 89.7 percent of the patients were already in an advanced stage of the disease when referred for nursing service. Forty-one patients, 30.2 percent, were still receiving visits at the end of the 3-month period of study.

Criteria and Goals

From this study and from the Nassau County Health Department's experience emerge certain findings which we believe may be useful to health officers as criteria for evaluating a cancer nursing service or as goals to strive for in such a program, even though the study group was small and the study period short. These findings have been divided into two groups: group A, those that may be reproducible elsewhere, that is, those that should not be influenced by local conditions; and group B, those that may be peculiar to this county because of local circumstances but that we feel indicate a good quality of service and are therefore desirable in a well-integrated cancer nursing program.

GROUP A

1. At least 30 percent of the reported cancer cases, exclusive of those reported at time of death, are receiving public health nursing service.

2. At least 2 percent of the total patients carried for public health nursing are cancer patients.

3. The distribution of cancer patients referred for nursing service, both male and female, corresponds to the distribution of the predominating cancer sites of all patients in the locality.

4. The site of the cancer, rather than the sex of the patient, largely determines the number of physical care services and supportive care services given.

5. Physical care services constitute an important part of the cancer nursing visit. They consist predominantly of general care, dressings, and irrigations.

6. Supportive care services also constitute an important part of the cancer nursing visit. They consist predominantly of emotional support and general health instruction.

7. One measure of the effectiveness of the nursing service is the proportion of patients discharged either to themselves or their family.

GROUP B

1. In a health department where there is effective cancer reporting and an established nursing service and where there is a genuine desire to provide nursing services for chronic disease patients, 30.5 percent of the reported cancer cases, exclusive of those reported at time of death, are receiving nursing care. This cancer caseload constitutes 2.8 percent of all cases carried for nursing service.

2. The public health nurse visits 76 percent of the referred cancer cases within the first 2 days.

3. Referrals for nursing service present the following pattern: 53 percent by private physician; 37 percent by hospitals; 10 percent by self, family, or other community agency.

4. Twenty-seven percent of the patients are discharged either to themselves or their family within 3 months after the nurse's initial visit. When those patients who die are excluded from this calculation, 39.4 percent of the cases achieve this measure of self-sufficiency.

5. The average number of visits per cancer patient ranges between 7 and 12, depending on age and sex of the patient.

It is not realistic, of course, to expect other health departments to arrive at exactly the same results in appraising their cancer nursing programs as were found in Nassau County. But the health officer may find these criteria and goals helpful in reviewing his cancer nursing program. In the course of such an appraisal, he should honestly ask himself what factors are governing his cancer nursing service. Is it a token service to satisfy community pressures? Is it dependent upon the interest of only a few nurses? Or is it a planned program within the framework of his public health objectives?

idea

Modified Oscilloscope

Monitoring a patient's blood pressure and electrocardiogram in difficult heart surgery has vital significance to the surgeon and anesthesiologist. The usual monitoring device is a cathode-ray oscilloscope. These oscilloscopes are expensive, often bulky, and because of an excessive number of controls, rather difficult to operate.

These disadvantages have recently been reduced by a modification of this instrument by F. W. Noble, M.E.E., B. R. Boone, M.D., N. McC. Garrahan, and R. E. Gorman of the National Heart Institute, National Institutes of Health, Public Health Service.

The National Heart Institute announced the successful application to an electrocardiograph machine of a version of an electronic switch that makes possible the adaptation of all existing single-beam oscilloscopes to perform like more complex double-beam instruments.

Though the cheaper and more frequently available single-beam oscilloscope has only one light source, with the addition of the electronic switch, it traces two curves on the screen. This is achieved by a rapid redirection and alternation of the light source between the curve above and the curve below. The switching process continues indefinitely, leaving behind two separate and distinct tracings.

A detailed technical description of the switch appears in the September 1955 issue of *The Journal of Laboratory and Clinical Medicine.*