Clinical Indications and Impact on Management: Fourth and Subsequent Posttherapy Follow-up ^{18}F-FDG PET/CT Scans in Oncology Patients

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The Centers for Medicare and Medicaid Services coverage includes 3 posttherapy ^{18}F-FDG PET/CT scans per patient and per tumor type. Any additional follow-up ^{18}F-FDG PET/CT scans will be reimbursed at the discretion of a local Medicare administrator, if deemed medically necessary. This study aimed to investigate common clinical indications for performing a fourth or additional follow-up ^{18}F-FDG PET/CT scans that could affect the management of patients. **Methods:** This was a retrospective institutional review of 433 oncology patients (203 men; mean age, 55 y), including a total of 1,659 fourth or subsequent follow-up PET/CT scans after completion of primary treatment. Twelve indications for performing a fourth or subsequent follow-up PET/CT scan were determined, and the impact of each of the 12 indications on patients' management was evaluated. **Results:** The primary tumors were breast cancer (92 patients, 426 scans), non-Hodgkin lymphoma (77 patients, 208 scans), Hodgkin disease (41 patients, 182 scans), colorectal cancer (70 patients, 286 scans), melanoma (69 patients, 271 scans), and lung cancer (84 patients, 286 scans). The indications were categorized in 4 groups: PET/CT for diagnosis of tumor recurrence (303/1,659, 18.3%), PET/CT before starting therapy for tumor recurrence (64/1,659, 3.9%), PET/CT to assess therapy response for tumor recurrence (507/1,659, 30.6%), and follow-up PET/CT after completion of treatment for tumor recurrence (785/1,659, 47.3%). Overall, fourth and subsequent follow-up ^{18}F-FDG PET/CT scans resulted in change in management in 31.6% of the scans (356 of 1,128) when the scans were obtained for medical necessities (indications 1–11), and in 5.6% of the scans (30/531) when the scans were obtained without any medical necessity (indication 12). **Conclusion:** The fourth and subsequent PET/CT scans obtained after completion of primary treatment led to a change in management in 31.6% of the scans when acquired for appropriate clinical reasons. Performing follow-up PET/CT without appropriate medical reason had a low impact on patients' management and should be avoided.

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Cancer is the leading cause of death, worldwide (*1*). Lung cancer, breast cancer, colorectal cancer, melanoma, and lymphoma are among the top 7 common cancer types in men and women, worldwide (*2,3*). Although multiple approved and under-research treatment modalities are available, cancers still recur months or even years after initial treatment. Identification of tumor recurrence, assessment of response to therapy, and follow-up of patients after recurrence are important for the patients' management and improvement in the quality of life (*4*).

Studies have shown that ^{18}F-FDG PET/CT is useful in detecting recurrence, especially in patients with rising tumor-marker levels and those with negative or equivocal conventional imaging findings (*1*). Although ^{18}F-FDG PET/CT is considered superior to conventional imaging methods, it has not been recommended in the routine follow-up of cancers (*5*). The Centers for Medicare and Medicaid Services announced that 3 ^{18}F-FDG PET scans are covered under § 1862(a)(1)(A) when used to guide subsequent management of antitumor treatment strategy after completion of initial anticancer therapy. Any additional follow-up ^{18}F-FDG PET/CT scans (beyond 3) will be covered only at the discretion of local Medicare administrative contractors, justified by a medical necessity (*6*). Previously, we evaluated the role of fourth and subsequent follow-up ^{18}F-FDG PET/CT scans obtained after primary treatment completion, in different cancers, and the results showed that ^{18}F-FDG PET/CT significantly affects the management of these patients especially when there is clinical suspicion of recurrence before performing the scans (*7–10*). This study aimed to investigate the common indications of medical necessity to perform a fourth and more follow-up ^{18}F-FDG PE/CT scans, which may have high impact on the management of patients with different cancers.

MATERIALS AND METHODS

Eligible Patients and Follow-up Scans

The Institutional Review Board approved this retrospective study under a waiver of informed consent. Using the PET database of our

institution, we identified all patients with a biopsy-proven diagnosis of one of the following cancers, breast cancer, non-Hodgkin lymphoma, Hodgkin lymphoma, colorectal cancer, melanoma, and lung cancer, who underwent PET/CT scanning between 2003 and 2015, and those patients who had undergone more than 3 posttreatment follow-up scans were included in the study. The indications for performing each of the first 3 and fourth and subsequent ^{18}F-FDG PET/CT scans were retrospectively determined using the clinical notes and the ^{18}F-FDG PET/CT requisition forms in electronic medical records. The indications were categorized into 4 groups: 1, ^{18}F-FDG PET/CT for diagnosis of recurrence; 2, ^{18}F-FDG PET/CT before starting therapy for tumor recurrence; 3, ^{18}F-FDG PET/CT to assess for therapy response of tumor recurrence; and 4, follow-up ^{18}F-FDG PET/CT after treatment of recurrence. Moreover, the impact of each fourth and subsequent ^{18}F-FDG PET/CT scans on management was measured using the treatment details before and after each ^{18}F-FDG PET/CT scan.

^{18}F-FDG PET/CT Protocol

The ^{18}F-FDG PET/CT scans were obtained on the basis of institutional clinical protocols for the different cancers, and the details about imaging protocols were discussed in our previous papers (*11–13*). As an imaging standard, patients were instructed to fast for at least 4 h, and the blood glucose levels were confirmed to be lower than 200 mg/dL. A dose of 5.55 MBq/kg (0.068 mCi/lb) of ^{18}F-FDG was injected, and after 1 h of uptake time ^{18}F-FDG PET/CT imaging was performed using either a Discovery LS (2-dimensional) or a Discovery VCT (3-dimensional) (GE Healthcare) scanner. The images were reconstructed with and without attenuation correction. The ^{18}F-FDG PET/CT scans were reported at the time of imaging by a board-certified nuclear medicine physician.

Indications and Measures of Change in Management

The scans, requisition forms, and clinical notes of the referring clinician were carefully reviewed before each scan to address the exact indication for the requested follow-up scans. A total of 12 indications for performing the fourth and subsequent follow-up scans were identified and subcategorized into the following 4 parts (Table 1):

Part 1, ^{18}F-FDG PET/CT for diagnosis of tumor recurrence, included:

- Indication 1, prior clinical suspicion of tumor recurrence: the clinician requested an ^{18}F-FDG PET/CT scan because the patients presented with signs or symptoms suspicious for tumor recurrence.
- Indication 2, prior rising tumor markers or abnormal laboratory tests: the clinician requested an ^{18}F-FDG PET/CT scan because there was an abnormal laboratory test result or increasing tumor markers.
- Indication 3, prior suggestive imaging (CT or MRI) for tumor recurrence: the clinician requested an ^{18}F-FDG PET/CT scan because there were suggestive findings in another imaging modality, for example, CT scan or MRI.
- Indication 4, prior indeterminate or suggestive ^{18}F-FDG PET/CT scan for tumor recurrence: the clinician requested an ^{18}F-FDG PET/CT scan because a prior ^{18}F-FDG PET/CT scan was indeterminate for tumor recurrence and a close follow-up with ^{18}F-FDG PET/CT was recommended.

Part 2, ^{18}F-FDG PET/CT before starting therapy for tumor recurrence, included:

- Indication 5, restaging after confirmation of tumor recurrence: the clinician requested an ^{18}F-FDG PET/CT scan because tumor recurrence was confirmed and a restaging scan before starting new treatment was needed/required.
- Indication 6, the clinician requested an ^{18}F-FDG PET/CT scan because new baseline imaging was needed before deciding further treatment (if the extent of disease will alter therapy).

Part 3, ^{18}F-FDG PET/CT to assess therapy response for tumor recurrence, included:

- Indication 7, therapy response assessment of recurrence: the clinician requested an ^{18}F-FDG PET/CT scan to evaluate the response of recurrent tumor at the completion of treatment.
- Indication 8, intratherapy assessment of recurrence: the clinician requested an ^{18}F-FDG PET/CT scan to evaluate the response of recurrent tumor to the treatment, for example, after 2–3 cycles of chemotherapy.
- Indication 9, follow-up scan to assess the previous equivocal response: the clinician requested an ^{18}F-FDG PET/CT scan to follow a previous equivocal ^{18}F-FDG PET/CT result for treatment response.

Part 4, follow-up ^{18}F-FDG PET/CT after completion of treatment for tumor recurrence, included:

- Indication 10, follow-up for stable disease: the clinician requested an ^{18}F-FDG PET/CT scan to follow up on a previous stable malignant lesion.
- Indication 11, follow-up for disease progression: the clinician requested an ^{18}F-FDG PET/CT scan to follow up on a previous malignant disease progression.
- Indication 12, follow-up of disease in remission or per clinical trial protocol: the clinician requested an ^{18}F-FDG PET/CT scan for a routine follow-up while patient was in remission, mostly as part of clinical trial protocols.

Patient records were reviewed by 4 postdoctoral fellows; the management modality and treatment details immediately before and after each PET scan were documented. The change in management after each PET scan was established. The impact of the fourth and subsequent follow-up ^{18}F-FDG PET/CT scans on management of patients was categorized into the following groups:

- No change in management: group 1—No treatment to no treatment: the patient received no treatment before the scan, and no treatment was started after the scan; and group 2—Treatment to continue the same treatment: the patient received antitumor therapy before the scan, and the same treatment was continued after the scan.
- Change in management: group 3—No treatment to new treatment: the patient received no treatment before the scan, but a new treatment was started after the scan; group 4—Treatment to cease treatment: the patients received antitumor therapy before the scan, and the treatment was discontinued after the scan; and group 5—Treatment to change in treatment regimen/modality: the patients received antitumor therapy before the scan and another new treatment modality or regimen was started after the scan.
- Change in management was unknown: group 6—Unknown: the treatment and management change were unknown.

RESULTS

Patient Characteristics

The primary tumors were breast cancer (92 patients, 426 scans), non-Hodgkin lymphoma (77 patients, 208 scans), Hodgkin disease (41 patients, 182 scans), colorectal cancer (70 patients, 286 scans), melanoma (69 patients, 271 scans), and lung cancer (84 patients, 286 scans). Therefore, 433 patients (203 men, 230 women; mean age ± SD, 55 ± 15 y) with 1,299 first 3 and 1,659 fourth and subsequent follow-up ^{18}F-FDG PET/CT scans after completion of primary treatment were included in the study. The mean number of fourth and subsequent follow up ^{18}F-FDG PET/CT scans for each patient was 3.8 (1,659/433). Most of the patients were white (84%, 364/433), and more than half of them (51.7%, 224/443) had advanced stage tumor at initial diagnosis.

TABLE 1
Clinical Indications and Their Frequencies

Indication no.	Clinical indication	*n*
^{18}F-FDG PET/CT for diagnosis of tumor recurrence		303 (18.3)
1	Prior clinical suspicion of tumor recurrence	56 (3.4)
2	Prior rising tumor markers or abnormal laboratory tests	25 (1.5)
3	Prior suggestive imaging (CT or MRI) for tumor recurrence	91 (5.5)
4	Prior indeterminate or suggestive ^{18}F-FDG PET/CT scan for tumor recurrence	131 (7.9)
^{18}F-FDG PET/CT before starting therapy for tumor recurrence		64 (3.9)
5	Restaging after confirmation of tumor recurrence	18 (1.1)
6	If the extent of disease will alter therapy or if a new baseline was needed before change in therapy	46 (2.8)
^{18}F-FDG PET/CT to assess therapy response for tumor recurrence		507 (30.6)
7	Therapy response assessment of recurrence	266 (16)
8	Intratherapy assessment of recurrence	210 (12.7)
9	Follow-up scan to assess the previous equivocal response	31 (1.9)
Follow-up ^{18}F-FDG PET/CT after completion of treatment for tumor recurrence		785 (47.4)
10	Follow-up for stable disease	132 (8)
11	Follow-up for disease progression	122 (7.4)
12	Follow-up of disease in remission or per clinical trial protocol	531 (32)

Data in parentheses are percentages.

Frequencies of Different Indications

There were total of 1,659 fourth and subsequent follow-up ^{18}F-FDG PET/CT scans, and the overall frequencies for each indication are summarized in Table 1. Table 2 summarizes the frequencies of the different indications with regards to the cancer type. The most common clinical indication among all of the cancers was when ^{18}F-FDG PET/CT was performed for follow-up of disease in remission or per clinical trial protocol (indication 12; 531/1,659, 32%), followed by indications 7, therapy response assessment of recurrence (266/1,659, 16%), and 8, intratherapy assessment of recurrence (210/1,659, 12.7%). All of the other indications were less than 10% of fourth and subsequent follow-up ^{18}F-FDG PET/CT scans.

Because right after completion of treatment most of the clinicians request imaging modalities to assess the therapy response, the frequency of different indications among the first 3 follow-up scans were different. As Table 3 shows, more than one third of first 3 follow-up scans were done to assess the treatment response (indications 7 and 8, therapy response and intratreatment assessment). However, the number of scans when ^{18}F-FDG PET/CT was performed for follow-up of disease in remission or per clinical trial protocol was high (307, 23.6%).

Impact of Obtaining Follow-up ^{18}F-FDG PET/CT Scans on Patient Management

The percentage of fourth and subsequent follow-up ^{18}F-FDG PET/CT scans that led to a change in patients' management was calculated for each indication. Table 4 summarizes the percentage of change in management based on indications. The indication 5, restaging after confirmation of tumor recurrence, had the highest percentage of change in management (12/18, 66.7%). The next indication with highest percentage of change in management was indication 6, if the extent of disease will alter therapy or if a new baseline was needed before change in therapy, with 60.9% (28/46) of scans obtained under this indication leading to a change in patients' management. Moreover, 50.5% (46/91) of the fourth and subsequent follow-up ^{18}F-FDG PET/CT scans that were done under indication 3, prior suggestive imaging (CT or MRI) for tumor recurrence, led to a change in management of patients. The next 2 indications with the highest percentage in change in management were indications 11, follow-up for disease progression, with 47.5% (58/122), and indication 1, prior clinical suspicion of tumor recurrence, with 37.5% (21/56) change in management. The indication 12, follow-up of disease in remission or per clinical trial protocol, led to only 5.6% (30/531) change in management of patients. The impact on management stratified by the major cancer diagnoses is presented in Table 5. The detailed information of management impact in each indication is provided in Supplemental Table 1 (supplemental materials are available at http://jnm.snmjournals.org).

Similarly, among the first 3 follow-up scans, indication 5, restaging after confirmation of tumor recurrence, had the highest percentage of change in management (28/35, 80%). The next indication with the highest percentage of change in management was indication 1, prior clinical suspicion of tumor recurrence, with 68.1% (47/69) of scans obtained under this indication leading to a change in patients' management.

TABLE 2
Frequency of Each PET/CT Indication in Different Cancer Types

Indication no.	Clinical indication	BC	NHL	HD	CRC	Melanoma	Lung cancer
^{18}F-FDG PET/CT for diagnosis of tumor recurrence							
1	Prior clinical suspicion of tumor recurrence	15	19	6	4	7	5
2	Prior rising tumor markers or abnormal laboratory tests suggesting tumor recurrence	14	1	0	8	0	2
3	Prior suggestive imaging (CT or MRI) for tumor recurrence	23	6	6	23	7	26
4	Prior indeterminate or suggestive PET/CT scan for tumor recurrence	17	21	8	25	19	41
^{18}F-FDG PET/CT before starting therapy for tumor recurrence							
5	Restaging after confirmation of tumor recurrence	5	0	2	2	7	2
6	If the extent of disease will alter therapy or if a new baseline was needed before change in therapy	13	6	4	12	3	8
^{18}F-FDG PET/CT to assess therapy response for tumor recurrence							
7	Therapy response assessment of recurrence	38	30	35	70	40	53
8	Intratreatment assessment of recurrence	38	3	39	36	47	47
9	Follow-up scan to assess the previous equivocal response	10	1	1	6	7	6
Follow-up ^{18}F-FDG PET/CT after completion of treatment for tumor recurrence							
10	Follow-up for stable disease	96	17	3	4	1	11
11	Follow-up for disease progression	62	7	3	21	12	17
12	Follow-up of disease in remission or per clinical trial protocol	95	97	75	75	121	68
Total		426	208	182	286	271	286

BC = breast cancer; NHL = non-Hodgkin lymphoma; HD = Hodgkin disease; CRC = colorectal cancer.

Moreover, 65.4% (17/26) and 60.7% (84/138) of the fourth and subsequent follow-up ^{18}F-FDG PET/CT scans that were obtained under indications 2 and 3, respectively, led to a change in management of patients.

DISCUSSION

^{18}F-FDG PET/CT is a valuable imaging modality that has been rapidly adopted in the management of oncologic patients. The role of ^{18}F-FDG PET/CT imaging in initial staging, therapy planning, and therapy assessment of different cancers has been well established (*14–20*). Multiple studies claimed that follow-up ^{18}F-FDG PET/CT scanning is valuable when there is a clinical suspicion of disease recurrence. Although some recent studies have supported the value of follow-up ^{18}F-FDG PET/CT in different solid tumors, the cost-effectiveness of the routine use of ^{18}F-FDG PET/CT during the follow-up period as an alternative to the combination of conventional imaging studies has not yet been systematically established (*21–23*). Most studies discourage performing routine ^{18}F-FDG PET/CT scanning as a surveillance imaging modality in asymptomatic oncology patients (*10,23–25*). Therefore, the aim of the present study was to determine different indications of performing follow-up ^{18}F-FDG PET/CT and its impact on the management of patients with regard to different malignancies.

Our results showed that the fourth and subsequent follow-up ^{18}F-FDG PET/CT scans had valuable impact on the management of patients when those follow-up scans were obtained to detect suspected tumor recurrence, to decide therapy planning for tumor recurrence, to assess the recurrent tumor response to the treatment, and to follow up when disease progression was suspected. On the other hand, the value of those scans was limited when the scans were obtained as part of routine surveillance.

Our results showed follow-up scans could have more than 40% impact on the management of patients when they are performed for the following indications: prior suggestive imaging (CT or MRI) for tumor recurrence, restaging after confirmation of tumor recurrence, if the extent of disease will alter therapy or if a new baseline was needed before change in therapy, and follow-up for disease progression. Prior studies showed that follow-up ^{18}F-FDG

TABLE 3
Indications and Management Impact of First 3 Scans

Indication no.	Clinical indication	No. of scans	No change in management	Change in management	Unknown
^{18}F-FDG PET/CT for diagnosis of tumor recurrence					
1	Prior clinical suspicion of tumor recurrence	69	21 (30.4)	47 (68.1)	1
2	Prior rising tumor markers or abnormal laboratory tests suggesting tumor recurrence	26	9 (34.6)	17 (65.4)	0
3	Prior suggestive imaging (CT or MRI) for tumor recurrence	138	53 (38.4)	84 (60.7)	1
4	Prior indeterminate or suggestive PET/CT scan for tumor recurrence	62	45 (72.6)	17 (27.4)	0
^{18}F-FDG PET/CT before starting therapy for tumor recurrence					
5	Restaging after confirmation of tumor recurrence	35	7 (20.0)	28 (80.0)	0
6	If extent of disease will alter therapy or if a new baseline was needed before change in therapy	35	16 (45.7)	19 (54.3)	0
^{18}F-FDG PET/CT to assess therapy response for tumor recurrence					
7	Therapy response assessment of recurrence	321	235 (73.2)	82 (25.5)	4
8	Intratreatment assessment of recurrence	163	142 (87.1)	21 (12.9)	0
9	Follow-up scan to assess the previous equivocal response	20	18 (90.0)	2 (10.0)	0
Follow-up ^{18}F-FDG PET/CT after completion of treatment for tumor recurrence					
10	Follow-up for stable disease	33	29 (87.9)	4 (12.1)	0
11	Follow-up for disease progression	44	17 (38.6)	26 (59.1)	1
12	Follow-up of disease in remission or per clinical trial protocol	307	256 (83.4)	46 (15.0)	5
13	Unknown/clinical notes unavailable	46	0	0	46
Total		1,299	848 (65.7)	393 (30.4)	58

Data in parentheses are percentages.

PET/CT scanning was valuable when conventional imaging results were equivocal for tumor recurrence (*26–28*).

Moreover, our results showed that follow-up ^{18}F-FDG PET/CT scans with other different indications, including prior clinical suspicion of tumor recurrence, prior rising tumor marker or abnormal laboratory tests suggesting recurrence, prior rising tumor markers or abnormal laboratory tests, therapy response assessment of recurrence, intratherapy assessment of recurrence, and follow-up scanning to assess the previous equivocal response, led to a change in the management of patients in 20%–40% of scan times. Previous studies also evaluated the value of ^{18}F-FDG PET/CT imaging after rising tumor markers or clinical suspicion of tumor recurrence, concluding that ^{18}F-FDG PET/CT is a good noninvasive imaging modality in these 2 settings to confirm or rule out tumor recurrences (*4,12,29,30*). Also, multiple studies confirmed the value of ^{18}F-FDG PET/CT scan in the therapy assessment setting after chemoradiation therapy in several cancer types (*31–33*).

We previously showed that fourth and subsequent follow-up PET/CT scans added similar value to the management of patients with lymphoma (*10*). Our results in the present study are consistent with our previous studies as well. Moreover, there are a considerable number of the follow-up PET/CT scans among the first 3 follow-up scans that were obtained routinely with little effect on patients' management. Therefore, it is recommended to consider the indications of the follow-up scans instead of considering the number of the follow-up scans to decide insurance coverage and reimbursement.

The least effective follow-up scans for patient management were those obtained as a follow-up for stable disease or as a follow-up of disease in remission or per clinical trial protocol, which led to a

TABLE 4
Value of Each Indication in Changing Patients' Management

Indication no.	Clinical indication	No change in management	Change in management	Unknown
^{18}F-FDG PET/CT for diagnosis of tumor recurrence				
1	Prior clinical suspicion of tumor recurrence	32 (57.1)	21 (37.5)	3
2	Prior rising tumor markers or abnormal laboratory tests suggesting tumor recurrence	18 (72.0)	7 (28.0)	0
3	Prior suggestive imaging (CT or MRI) for tumor recurrence	38 (41.8)	46 (50.5)	7
4	Prior indeterminate or suggestive PET/CT scan for tumor recurrence	100 (76.3)	26 (19.8)	5
^{18}F-FDG PET/CT before starting therapy for tumor recurrence				
5	Restaging after confirmation of tumor recurrence	6 (33.3)	12 (66.7)	0
6	If extent of disease will alter therapy or if a new baseline was needed before change in therapy	15 (32.6)	28 (60.9)	3
^{18}F-FDG PET/CT to assess therapy response for tumor recurrence				
7	Therapy response assessment of recurrence	170 (63.9)	83 (31.2)	13
8	Intratreatment assessment of recurrence	162 (77.1)	44 (21.0)	4
9	Follow-up scan to assess the previous equivocal response	20 (64.5)	9 (29.0)	2
Follow-up ^{18}F-FDG PET/CT after completion of treatment for tumor recurrence				
10	Follow-up for stable disease	107 (81.1)	22 (16.7)	3
11	Follow-up for disease progression	56 (45.9)	58 (47.5)	8
12	Follow-up of disease in remission or per clinical trial protocol	479 (90.2)	30 (5.6)	22
Total		1,203 (72.5)	386 (23.3)	70

Data in parentheses are percentages.

change in management in 16.7% and 5.6% of scans, respectively. Our results showed that approximately 40% of fourth and subsequent ^{18}F-FDG PET/CT scans belong to these categories, of which less than 17% of them led to a change in the management of patients. Some of the previous studies recommended not performing ^{18}F-FDG PET/CT for surveillance when no clinical suspicion of disease recurrence was present. Performing routine surveillance ^{18}F-FDG PET/CT was not cost-effective and had no significant impact on management.

TABLE 5
Management Impact of Fourth and Subsequent Follow-up Scans Based on Major Oncologic Diagnoses

Major cancer types	No. of fourth and subsequent follow-up scans	No change in management	Change in management	Unknown
Breast cancer	426	331 (77.7)	90 (21.1)	5 (1.2)
Non-Hodgkin lymphoma	208	153 (73.6)	28 (13.5)	27 (12.9)
Hodgkin disease	182	133 (73.0)	40 (22.0)	9 (5.0)
Colorectal cancer	286	176 (61.5)	98 (34.3)	12 (4.2)
Melanoma	271	220 (81.2)	49 (18.1)	2 (0.7)
Lung cancer	286	190 (66.4)	81 (28.3)	15 (5.3)

Data in parentheses are percentages.

The minimal impact on management could be due to lead time bias, and if those patients could get a clinical follow-up, the tumor recurrence would become symptomatic or detected using conventional imaging in several weeks (*10,34–36*).

The results of the present study should be interpreted with its limitations. This is a retrospective study, and the indications of the ^{18}F-FDG PET/CT scans were determined retrospectively using electronic medical records and referring physician notes; this could possibly lead to inaccurate definition of the ^{18}F-FDG PET/CT indications. Moreover, the change in management of the patients was extracted from the follow-up clinical notes, with limitation of retrospective data collection. The referring clinician used other imaging modalities and clinical information in addition to ^{18}F-FDG PET/CT results to offer the best treatment and management to the patients. Therefore, the effect of additional information on management of the patients could not be measured or excluded.

CONCLUSION

The fourth and subsequent follow-up ^{18}F-FDG PET/CT scans obtained after completion of primary treatment led to a change in management in 31.6% of the scans when the scans were acquired for medical necessity or appropriate clinical indications. We strongly discourage performing ^{18}F-FDG PET/CT imaging as part of routine surveillance when there is no clinical indication, because the impact on patient management is limited.

DISCLOSURE

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