Diagnostic and Procedural Imaging Curricula in Physical Therapist Professional Degree Programs: Current Status

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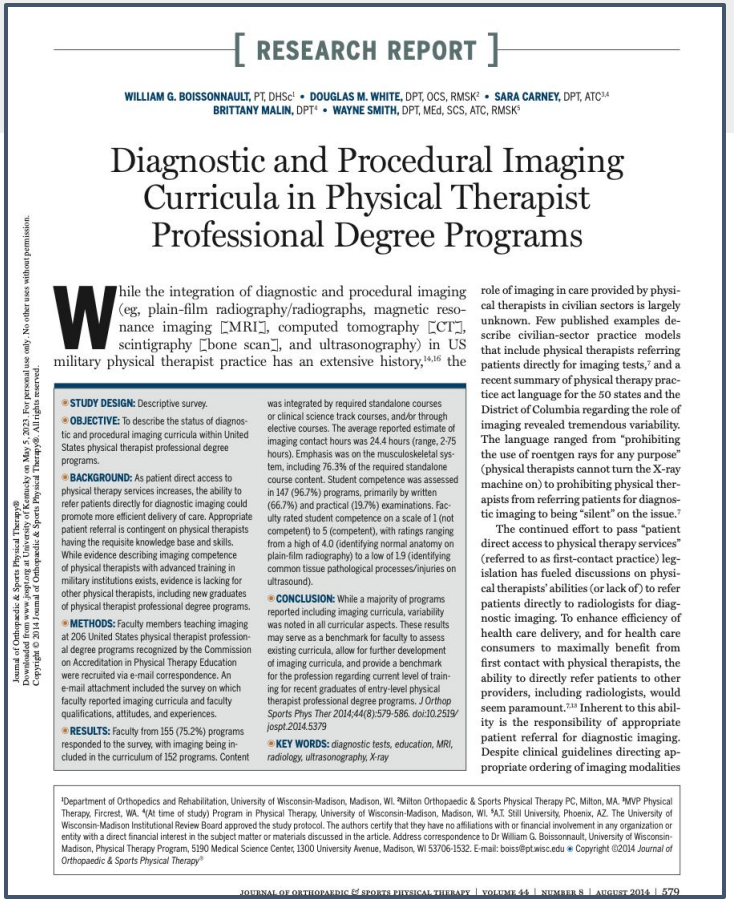
Background

Benchmark data of imaging curricula in PT programs collected in 2013

Results suggested significant variation between programs



[RESEARCH REPORT]

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Diagnostic and Procedural Imaging Curricula in Physical Therapist Professional Degree Programs

STUDY DESIGN: Descriptive survey.

OBJECTIVE: To describe the status of diagnostic and procedural imaging curricula within United States physical therapist professional degree programs.

BACKGROUND: As patient direct access to physical therapy services increases, the ability to refer patients directly for diagnostic imaging could promote more efficient delivery of care. Appropriate patient referral is contingent on physical therapists having the requisite knowledge base and skills. While evidence describing imaging competence of physical therapists with advanced training in military institutions exists, evidence is lacking for other physical therapists, including new graduates of physical therapist professional degree programs.

METHODS: Faculty members teaching imaging at 206 United States physical therapist professional degree programs recognized by the Commission on Accreditation in Physical Therapy Education were recruited via e-mail correspondence. An e-mail attachment included the survey on which faculty reported imaging curricula and faculty qualifications, attitudes, and experiences.

RESULTS: Faculty from 155 (75.2%) programs responded to the survey, with imaging being included in the curriculum of 152 programs. Content was integrated by required standalone courses or clinical science track courses, and/or through elective courses. The average reported estimate of imaging contact hours was 24.4 hours (range, 2-75 hours). Emphasis was on the musculoskeletal system, including 76.3% of the required standalone course content. Student competence was assessed in 147 (96.7%) programs, primarily by written (66.7%) and practical (19.7%) examinations. Faculty rated student competence on a scale of 1 (not competent) to 5 (competent), with ratings ranging from a high of 4.0 (identifying normal anatomy on plain-film radiography) to a low of 1.9 (identifying common tissue pathological processes/injuries on ultrasound).

CONCLUSION: While a majority of programs reported including imaging curricula, variability was noted in all curricular aspects. These results may serve as a benchmark for faculty to assess existing curricula, allow for further development of imaging curricula, and provide a benchmark for the profession regarding current level of training for recent graduates of entry-level physical therapist professional degree programs. *J Orthop Sports Phys Ther 2014;44(8):579-586. doi:10.2519/jospt.2014.5379*

KEY WORDS: *diagnostic tests, education, MRI, radiology, ultrasonography, X-ray*

While the integration of diagnostic and procedural imaging (eg, plain-film radiography/radiographs, magnetic resonance imaging [MRI], computed tomography [CT], scintigraphy [bone scan], and ultrasonography) in US military physical therapist practice has an extensive history,[14,16] the role of imaging in care provided by physical therapists in civilian sectors is largely unknown. Few published examples describe civilian-sector practice models that include physical therapists referring patients directly for imaging tests,[7] and a recent summary of physical therapy practice act language for the 50 states and the District of Columbia regarding the role of imaging revealed tremendous variability. The language ranged from "prohibiting the use of roentgen rays for any purpose" (physical therapists cannot turn the X-ray machine on) to prohibiting physical therapists from referring patients for diagnostic imaging to being "silent" on the issue.[7]

The continued effort to pass "patient direct access to physical therapy services" (referred to as first-contact practice) legislation has fueled discussions on physical therapists' abilities (or lack of) to refer patients directly to radiologists for diagnostic imaging. To enhance efficiency of health care delivery, and for health care consumers to maximally benefit from first contact with physical therapists, the ability to directly refer patients to other providers, including radiologists, would seem paramount.[7,13] Inherent to this ability is the responsibility of appropriate patient referral for diagnostic imaging. Despite clinical guidelines directing appropriate ordering of imaging modalities

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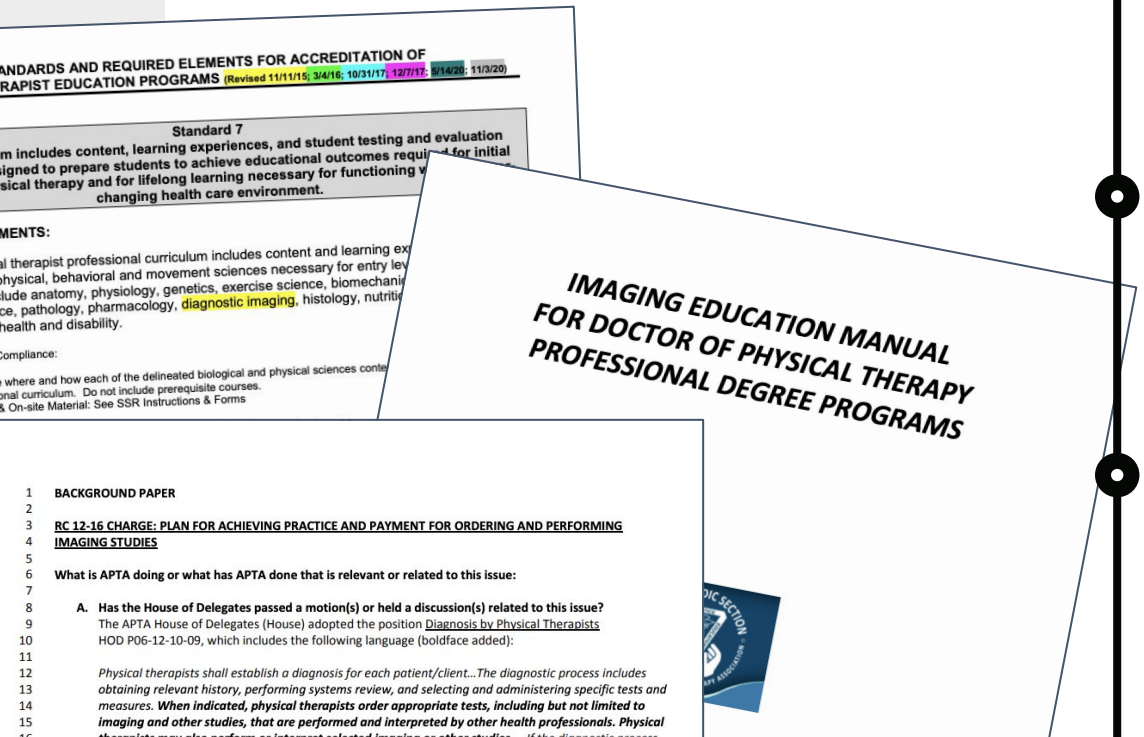
Previous Curricular Discrepancies

- When content is included
- What content is included
- How content is included and integrated with other material
- How students are assessed

“This inconsistency may be related to a current lack of educational guidelines and standards for imaging content, which may be a reflection of the current variable role of imaging in the delivery of physical therapist services and is in part predicated by inconsistent language found in physical therapist state practice acts.”

Evolution of Imaging in PT Practice



2015

Imaging SIG publishes Imaging Education Manual

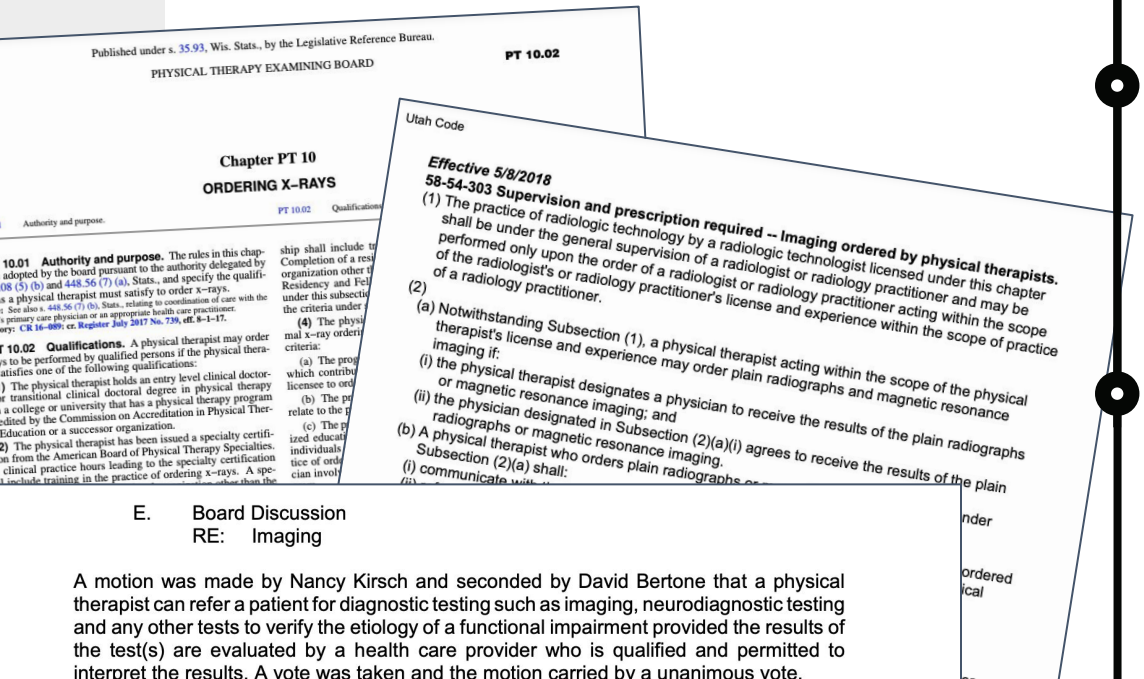
2016

CAPTE guidelines include diagnostic imaging

2016

APTA HOD passes RC 12-16 with 93% favorable vote

Evolution of Imaging in PT Practice



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PHYSICAL THERAPY EXAMINING BOARD PT 10.02

Chapter PT 10

ORDERING X-RAYS

PT 10.02 Qualifications

Authority and purpose.

PT 10.01 Authority and purpose. The rules in this chapter are adopted by the board pursuant to the authority delegated by ss. 448.08 (5) (b) and 448.56 (7) (a), Stats., and specify the qualifications for a physical therapist must satisfy to order x-rays.

PT 10.02 Qualifications. A physical therapist may order x-rays to be performed by qualified persons if the physical therapist satisfies one of the following qualifications:

(1) The physical therapist holds an entry level clinical doctorate or transitional clinical doctoral degree in physical therapy from a college or university that has a physical therapy program accredited by the Commission on Accreditation in Physical Therapy Education or a successor organization.

(2) The physical therapist has been issued a specialty certification from the American Board of Physical Therapy Specialties, has clinical practice hours leading to the specialty certification include training in the practice of ordering x-rays. A spe-

Utah Code

Effective 5/8/2018

58-54-303 Supervision and prescription required -- Imaging ordered by physical therapists.

(1) The practice of radiologic technology by a radiologic technologist licensed under this chapter shall be under the general supervision of a radiologist or radiology practitioner and may be performed only upon the order of a radiologist or radiology practitioner acting within the scope of the radiologist's or radiology practitioner's license and experience within the scope of practice of a radiology practitioner.

(2)

(a) Notwithstanding Subsection (1), a physical therapist acting within the scope of the physical therapist's license and experience may order plain radiographs and magnetic resonance imaging if:

(i) the physical therapist designates a physician to receive the results of the plain radiographs or magnetic resonance imaging; and

(ii) the physician designated in Subsection (2)(a)(i) agrees to receive the results of the plain radiographs or magnetic resonance imaging.

(b) A physical therapist who orders plain radiographs

Subsection (2)(a) shall:

(i) communicate

E. Board Discussion
RE: Imaging

A motion was made by Nancy Kirsch and seconded by David Bertone that a physical therapist can refer a patient for diagnostic testing such as imaging, neurodiagnostic testing and any other tests to verify the etiology of a functional impairment provided the results of the test(s) are evaluated by a health care provider who is qualified and permitted to interpret the results. A vote was taken and the motion carried by a unanimous vote.

2017

Wisconsin passes legislation to allow imaging referral for x-rays

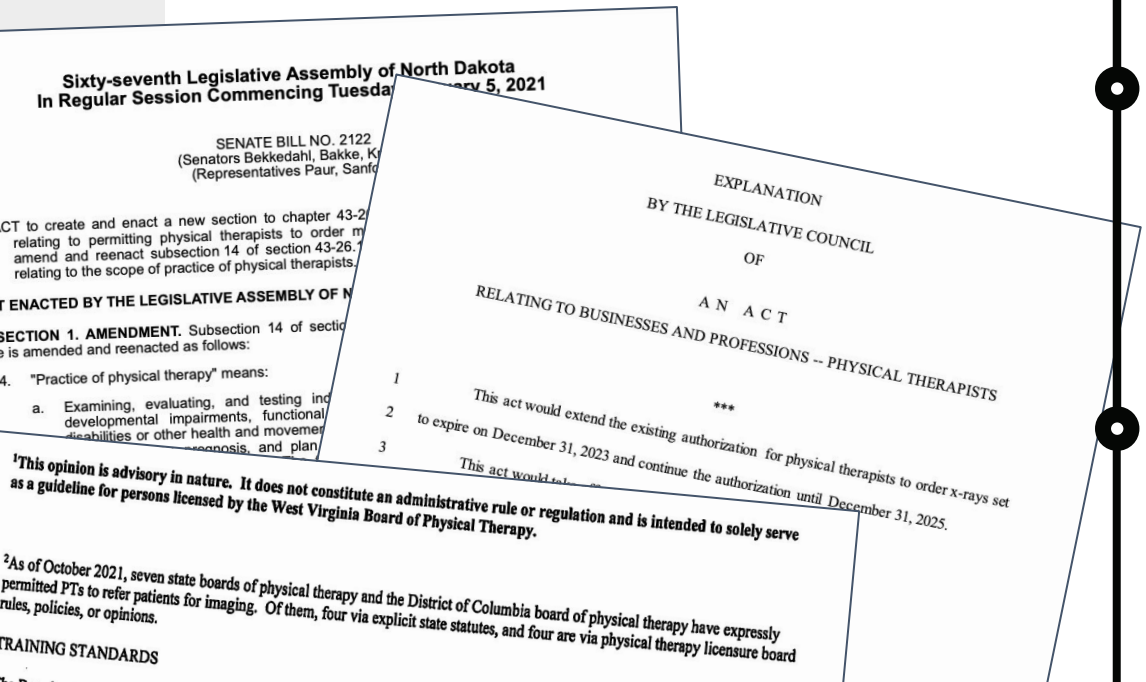
2018

Utah passes legislation to allow referral for x-rays and MRI

2019

New Jersey State Board clarifies that PTs can refer for imaging studies

Evolution of Imaging in PT Practice



Sixty-seventh Legislative Assembly of North Dakota
In Regular Session Commencing Tuesda

SENATE BILL NO. 2122
(Senators Bekkedahl, Bakke, K
(Representatives Paur, Sanfo

CT to create and enact a new section to chapter 43-2
relating to permitting physical therapists to order m
amend and reenact subsection 14 of section 43-26.
relating to the scope of practice of physical therapists.

T ENACTED BY THE LEGISLATIVE ASSEMBLY OF N

SECTION 1. AMENDMENT. Subsection 14 of sectio
e is amended and reenacted as follows:

4. "Practice of physical therapy" means:

a. Examining, evaluating, and testing ind
developmental impairments, functional
disabilities or other health and movemer
gnosis, and plan

EXPLANATION
BY THE LEGISLATIVE COUNCIL
OF
A N A C T
RELATING TO BUSINESSES AND PROFESSIONS -- PHYSICAL THERAPISTS

1 ***
2 This act would extend the existing authorization for physical therapists to order x-rays set
3 to expire on December 31, 2023 and continue the authorization until December 31, 2025.
This act would

[1]This opinion is advisory in nature. It does not constitute an administrative rule or regulation and is intended to solely serve as a guideline for persons licensed by the West Virginia Board of Physical Therapy.

[2]As of October 2021, seven state boards of physical therapy and the District of Columbia board of physical therapy have expressly permitted PTs to refer patients for imaging. Of them, four via explicit state statutes, and four are via physical therapy licensure board rules, policies, or opinions.

TRAINING STANDARDS

2021

North Dakota passes legislation to allow for referral of x-rays

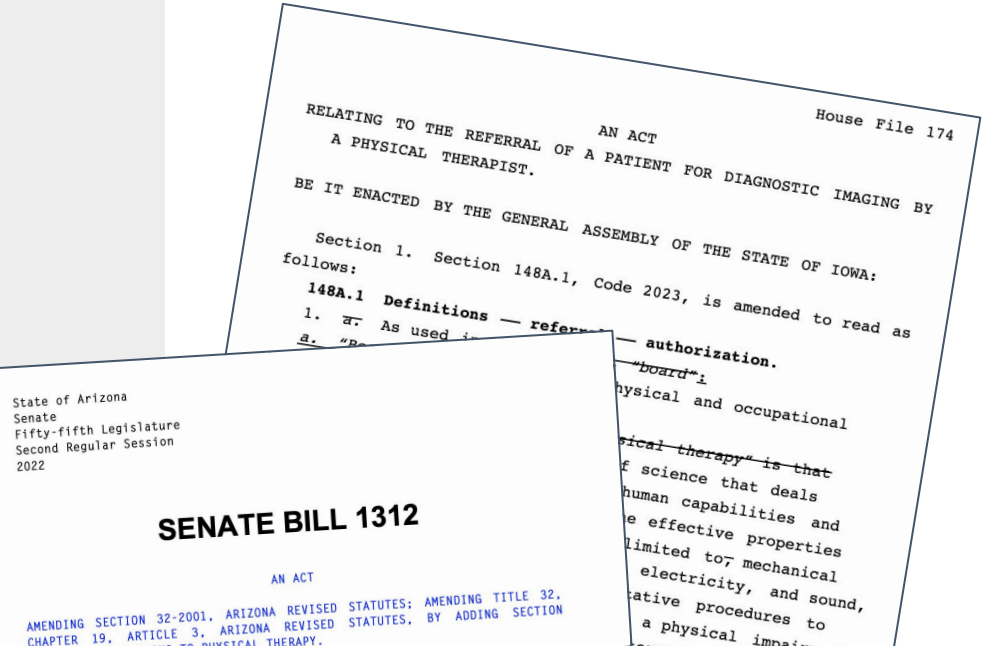
2021

Rhode Island passes legislation to allow PTs to order x-rays with sunset clause

2021

West Virginia Board of PT issues statement permitting PTs to refer patients for imaging

Evolution of Imaging in PT Practice



House File 174

AN ACT

RELATING TO THE REFERRAL OF A PATIENT FOR DIAGNOSTIC IMAGING BY A PHYSICAL THERAPIST.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF IOWA:

Section 1. Section 148A.1, Code 2023, is amended to read as follows:

148A.1 Definitions — referral — authorization.

1. ~~a.~~ As used in this chapter, unless the context otherwise requires, "board":

State of Arizona
Senate
Fifty-fifth Legislature
Second Regular Session
2022

SENATE BILL 1312

AN ACT

AMENDING SECTION 32-2001, ARIZONA REVISED STATUTES; AMENDING TITLE 32, CHAPTER 19, ARTICLE 3, ARIZONA REVISED STATUTES, BY ADDING SECTION

2022

Arizona passes legislation to allow referral for x-rays

2023

Iowa passes legislation to allow referral for x-rays and MRIs

Due to the evolving imaging landscape an update on educational practices and instructional content in DPT programs is warranted

Survey Development

- Institution Demographics
- Diagnostic & Procedural Imaging Curricula
- Faculty Demographics

REDCap
Research Electronic Data Capture

Survey Distribution

Programs identified with CAPTE online listing

320 programs overall, with 272 fully accredited at time of survey

Program director emails identified as point of contact

Survey launched December 2022

Two more emails were sent requesting for completion of survey

Data Collection closed April 2023

Response Rate

- 186 responses total
- 164 responses from the 272 accredited institutions
  - 14 developing programs
  - 8 unspecified
- 60.3% response rate from accredited institutions

Imaging Referral Privileges

Is your institution located in a state whose rules and regulations allow physical therapists to directly refer patients to radiologists/radiology departments for diagnostic imaging?

	2023
Specifically Allowed	11.7%
Specifically Not Allowed	35.2%
Silent	45.1%
Unsure	8%

Inclusion of Imaging Content

In what year did your program specifically adopt inclusion of imaging content consistent with practitioners having skills to refer for imaging as a part of clinical practice?

Before 2010	39.5%
Between 2010-2016	44.9%
After 2016	10.2%
Not Adopted	5.4%

Barriers to Inclusion

None	43.9%
Lack of Qualified Faculty	21.3%
Not Enough Time in the Curriculum	21.3%
Lack of Literature Describing Imaging in Physical Therapist Practice	11.0%
Imaging Not Considered an Entry-Level Skill	9.1%
Imaging Not Considered a Curricular Priority	7.9%

3% reported imaging as not yet being adopted

Contact Hours for Imaging Content

- **Mean number of total contact hours in the curriculum was 28.0 hrs**
  - **17.7 hrs in classroom/lecture**
  - **6.9 hrs of online-coursework**
  - **4.8 hrs in laboratory type setting**
  - **2.7 hrs in supervised actual patient care**
  - **2.0 hrs of simulated patient experiences**
  - **1.7 hrs in video coursework**

First Introduction to Imaging

	2014	2023
First Year	63.6%	66.9%
Second Year	29.1%	28.6%
Third Year	6.6%	4.6%

Instructional Methods

	2014	2023
Separate/Standalone Course	50%	47.0%
Within Required Clinical Science Course	57%	31.7%
Separate Elective Course	4%	2.4%
Component of Multiple Courses Other than Core Clinical Science Courses	19.9%	41.5%

More than one response could be selected

Content Emphasis

- Heavy emphasis placed on musculoskeletal system noted in the stand-alone imaging courses
  - 82.4% musculoskeletal content
  - 8.9% neurological system
  - 6.4% cardiovascular or pulmonary systems
  - 2.6% pediatrics

Student Resources

Resource & Utility	Textbooks	ACR Appropriateness Criteria	JOSPT MSK Imaging Feature or JOSPT Cases	Radiopaedia
Students Required	62.35% McKinnis[1]: 56.9% Malone et al[2]: 3.65% Swain & Bush[3]: 0.9% Malone et al[4]: 0.9%	38.5%	24.2%	38.5%
Students Recommended	59.8% McKinnis[1]: 29.9% Malone et al[2]: 11.6% Swain & Bush[3]: 9.1% Greenspan[5]: 6.5% Malone et al[4]: 2.7%	27.4%	47.0%	27.4%

Key:

1= McKinnis: Fundamentals of Musculoskeletal Imaging
2=Malone et al.: Imaging in Rehabilitation
3=Swain & Bush: Diagnostic Imaging for Physical Therapists
4=Malone et al.: Imaging for the Health Care Practitioner
5=Greenspan: Orthopedic Imaging: A Practical Approach

Faculty Resources

Resource & Utility	Textbooks	ACR Appropriateness Criteria	JOSPT MSK Imaging Feature or JOSPT Cases	Radiopedia
Faculty	99.5% McKinnis[1]: 76.8% Greenspan[5]: 10.4% Malone et al[2]: 8.5% Swain & Bush[3]: 2.4% Malone et al[4]: 1.8%	48.2%	53.0%	42.7%
Key	1= McKinnis: Fundamentals of Musculoskeletal Imaging 2=Malone et al.: Imaging in Rehabilitation 3=Swain & Bush: Diagnostic Imaging for Physical Therapists 4=Malone et al.: Imaging for the Health Care Practitioner 5=Greenspan: Orthopedic Imaging: A Practical Approach			

Assessing Student Competence

Methods used to assess student competency:

- **Written Examination: 90.9% (for 79% of total grade)**
- **Practical Examination: 37.2% (for 24.9% of total grade)**
- **Simulated Patient Examination: 20.7% (for 18.2% of total grade)**
- **Oral Examination: 9.8% (for 11.6% of total grade)**
- **Real Patient Examination: 4.3% (for 8.6% of total grade)**

16% of programs utilized other assessment methods:

- **Case Reports, infographics and other written assignments**

Cumulative Assessment

With cumulative assessment at the end of the curriculum:

- **36.4% report imaging is included**
- **31.1% report imaging not being included**
- **32.5% report not having a competency exam**

Means of Assessment of Student Competency

Identify Normal Anatomy

Radiography		MRI		CT		Ultrasound		Scintigraphy	
2014	2023	2014	2023	2014	2023	2014	2023	2014	2023
90.7	87.2	76.8	78.7	64.2	68.9	40.4	51.2	35.1	31.1

Means of Assessment of Student Competency

Identify skeletal pathological processes/injuries:

Radiography		MRI		CT		Ultrasound		Scintigraphy	
2014	2023	2014	2023	2014	2023	2014	2023	2014	2023
87.4	85.4	72.8	74.4	68.2	71.3	31.1	36.0	54.4	42.7

Means of Assessment of Student Competency

Identify soft tissue pathological processes/injuries:

Radiography		MRI		CT		Ultrasound		Scintigraphy	
2014	2023	2014	2023	2014	2023	2014	2023	2014	2023
54.3	46.3	78.8	79.9	44.4	45.7	40.4	57.9	14.6	11.0

Means of Assessment of Student Competency

Utilization of clinical guidelines for referring patients for diagnostic imaging

Radiography		MRI		CT		Ultrasound		Scintigraphy	
2014	2023	2014	2023	2014	2023	2014	2023	2014	2023
86.8	82.3	55.6	62.8	48.3	59.2	31.8	44.5	36.4	42.1

Means of Assessment of Student Competency

Adjunct to patient interventions

Radiography		MRI		CT		Ultrasound		Scintigraphy	
2014	2023	2014	2023	2014	2023	2014	2023	2014	2023
55.6	36.0	42.0	28.1	36.4	26.8	45.0	45.7	25.8	17.1

Faculty Perception of Student Competence

Imaging Modality	2014	2023
Radiography	3.7	3.9
MRI	2.9	3.5
CT	2.7	3.5
Ultrasound	2.0	2.5
Scintigraphy	2.5	2.6

Is Referring Patients for Imaging an Entry-Level Skill?

Imaging Modality	Perception of Entry-Level Skill
Radiography	95.2%
MRI	84.4%
CT	94.7%
Ultrasound	79.6%
Scintigraphy	66%

Increasing Student Knowledge

Ways to increase student knowledge of imaging:

- **Increase emphasis during clinical affiliations: 64.6%**
- **Increased laboratory hours: 54.3%**
- **Increase lecture hours: 39.6%**
- **Specialist guest lecture: 12.8%**
- **No change necessary: 6.1%**

Increasing Instructor Knowledge

Ways to increase instructor knowledge:

- **Continuing education: 56.3%**
- **Clinical Experience: 53.9%**
- **Residency/Fellowship: 33.8%**
- **Textbooks/web-based resources: 29.9%**

Limitations

- Selection bias can occur as individuals self-select responses
- Lack of participation
- Partial Responses

Conclusion

- Imaging content is not uniformly integrated into curriculum.
- To improve end of program competence, instructors should:
  - Utilize readily available resources, such as:
    - ACR Appropriateness Criteria
    - I-SIG
  - Reach out to Clinical Instructors for reinforcement of diagnostic imaging in patient care experiences

Questions?