

## Supplemental Digital Appendix 1

### **Detailed Course Design and Development of Online Materials, From a Study of Musculoskeletal Anatomy and Massage Therapy Coursework, University of Iowa College of Medicine, 2014**

#### **Course Design**

Each class session focused on a different region of the body.

Week 1: Lower Limb

Week 2: Upper Limb

Week 3: Neck and Shoulders

Week 4: Abdomen/Whole Body

In each session, the course co-directors led a brief physical warm-up and meditation to focus student attention and presence in the learning space. The instructors briefly demonstrated some of the complex maneuvers, answered questions about the videos, and outlined the activities to practice in that session. In each session students paired off and practiced with their massage partner with supervision from course instructors. The massage techniques practiced in the sessions were focused on relieving pain and were typically a mixture of Swedish and myofascial massage techniques. Students also received instruction in draping and how to help individuals feel comfortable on the massage table.

#### **Development of online course materials**

Pre-session videos were produced and recorded by the course co-directors to demonstrate the SA landmarks for each region and discuss common pain conditions affecting those regions and massage maneuvers that may address them. Three-dimensional anatomy animations were constructed with Cyber-Anatomy software (VIVED, Coralville, IA, USA) to accompany the regions of interest. Readings were either written by the authors or curated from internet sources. All video resources are publicly available on YouTube (Links below).

Week 1 Video Playlist:

<https://www.youtube.com/playlist?list=PLXFpotXLJMTewfEx6U-9xexvIjifHKWzF>

Week 2 Video Playlist:

[https://www.youtube.com/playlist?list=PLXFpotXLJMTcH6L5OAP\\_Q2bW4JE78tvHb](https://www.youtube.com/playlist?list=PLXFpotXLJMTcH6L5OAP_Q2bW4JE78tvHb)

Week 3 Video Playlist:

<https://www.youtube.com/playlist?list=PLXFpotXLJMTe9kkkJZ1Rxrs8rrlBq1SY9>

Week 4 Video Playlist:

<https://www.youtube.com/playlist?list=PLXFpotXLJMTfpHfUHqnebNNaYf6EvwtxM>

## Supplemental Digital Appendix 2

### **Musculoskeletal Surface Anatomy Knowledge Assessment, From a Study of Musculoskeletal Anatomy and Massage Therapy Coursework, University of Iowa College of Medicine, 2014**

This assessment poses a series of 23 questions about surface anatomy of primarily musculoskeletal structures. Some of these you might know from your current study of gross anatomy. Others you may have no idea. Don't feel bad about not knowing the answers to these questions and don't look up the answers either. These are some of the things that you will be learning in this course and we'd just like to know where you are at before the course starts!

When your quiz submits, it will not store a graded copy for you to review because we will want you to solve these questions again after the course is complete. After you complete the Post-course version, both will be released for you to review at your leisure. You can only complete one attempt of this quiz.

1. Which landmark is palpable on the medial surface of the elbow region?

- a. Medial epicondyle of humerus**
- b. Styloid process of ulna
- c. Olecranon process of ulna
- d. Greater tubercle of humerus
- e. Head of radius

2. In the inferior half of the thigh region, please place the following structures in the order that your hands would feel them from medial to lateral. **(key below is reversed)**

- a. Iliotibial tract (IT band)
- b. Vastus lateralis
- c. Rectus femoris
- d. Vastus medialis
- e. Sartorius
- f. Gracilis

3. To palpate the muscle bellies of the long flexor of the toes, where would you need to feel?

- a. Anterior to the inferior fibula
- b. Posterior to the inferior fibula
- c. Anterior to the inferior tibia
- d. Posterior to the inferior tibia**

4. Which muscle is felt by placing your hand in the axilla and pressing on the broad anterior surface of the scapula?
- a. Supraspinatus
  - b. Teres major
  - c. Subscapularis**
  - d. Teres minor
  - e. Serratus anterior
5. Which muscle has an attachment on the head of the fibula?
- a. Semitendinosus
  - b. Semimembranosus
  - c. Popliteus
  - d. Fibularis brevis
  - e. Biceps femoris**
6. Which is not a bony attachment of Trapezius?
- a. Skull
  - b. Greater tubercle of humerus**
  - c. Spine of scapula
  - d. Spinous processes of vertebrae
  - e. Acromion of scapula
7. Which structure can be palpated posterior to the Lateral malleolus of the fibula?
- a. Fibularis longus tendon**
  - b. Posterior tibial artery
  - c. Tibialis posterior tendon
  - d. Flexor digitorum longus tendon
  - e. Tibialis anterior tendon
8. Which muscle is felt by palpating along the medial side of a patient's foot?
- a. Adductor hallucis
  - b. Flexor digitorum brevis
  - c. Abductor digiti minimi
  - d. Abductor hallucis**
  - e. Flexor hallucis longus
9. Where would you be able to palpate the pisiform bone?
- a. At the proximal end of the hypothenar eminence**
  - b. At the distal end of the thenar eminence
  - c. At the distal end of the palm
  - d. At the proximal end of the center of the palm
  - e. At the distal lateral forearm

10. Which bone is palpable from the anterior, just inferior to the distal end of the tibia?

- a. Cuboid
- b. 1<sup>st</sup> metatarsal
- c. Calcaneus
- d. Talus**
- e. 5<sup>th</sup> metatarsal

11. Which vertebra in the posterior neck region is most easily palpable, even visible in many patients?

- a. C5
- b. C6
- c. C7**
- d. T1
- e. T2

12. Place the tissues that your hands are feeling in order from superficial to deep if your hands are medial and superior to the scapula.

- Trapezius**
- Rhomboid major**
- Splenius**
- Longissimus/Spinalis**

13. If you palpate the iliac crests in a prone patient and draw a line between the crests, which vertebra does the line intersect?

- a. L1
- b. L2
- c. L3
- d. L4**

14. Which bony landmark can be felt at the inferior end of the buttocks, most easily when the thigh is flexed?

- a. Ischial tuberosity**
- b. Sacrum
- c. Coccyx
- d. Posterior inferior iliac spine

15. The gluteal “dimples of venus” shown here mark the position of which anatomical structure?

**(Sacroiliac joint/Posterior superior iliac spine)**



16. Which bony landmark can be palpated immediately inferior to the lateral end of the clavicle?

- a. Greater tubercle of humerus
- b. Acromion of scapula
- c. Coracoid of scapula**
- d. Lesser tubercle of humerus

17. Which back structure marks the location of the T7 vertebra?

**Inferior angle of scapula**

18. Which muscle are you feeling if you are feeling the posterior border of the ulna and then move your hand lateral?

- a. Extensor digitorum**
- b. Brachioradialis
- c. Flexor carpi ulnaris
- d. Pronator teres

19. Which muscles form the anterior and posterior walls of the axilla?

**Latissimus dorsi and Pectoralis major**

20. True or **False**: The brachial artery is located lateral to the Biceps brachii tendon in the cubital fossa?

21. List the order of structures from lateral to medial in the anterior wrist:

**Styloid process of radius**

**Radial artery**

**Flexor carpi radialis tendon**

**Palmaris longus tendon**

**Ulnar artery**

**Flexor carpi ulnaris tendon**

22. For each of the three joints (MP **(A)**, PIP **(D)**, DIP **(G)**) indicate which letter most closely matches the location of the joint beneath the skin.



23. What three steps can you use to get the Sternocleidomastoid and External jugular vein to pop?

**Turn head to contralateral, elevate chin, Val Salva maneuver**

## Supplemental Digital Appendix 3

### Massage Therapy Knowledge Assessment, From a Study of Musculoskeletal Anatomy and Massage Therapy Coursework, University of Iowa College of Medicine, 2014

This survey will ask you to provide answers to a series of questions about massage therapy practice. It is expected that you will NOT know many of the answers to these questions - please do not look up the answers! We're looking for an accurate assessment of your baseline level of knowledge on this topic today. You might think of this as a list of the types of things you'll learn about massage therapy in this course.

As with the other surveys, your responses will be deidentified, please feel free to respond with total honesty. If you don't know the answer to a question, please type "I don't know."

#### Question 1

What are some ways that massage therapy relieves pain? List as many as you are aware of.  
Example correct responses: Encourages release of pain-relieving hormones; separates adhesions between tissues; manually pumps blood and lymph fluid through tissues – bringing oxygen and nutrients and carrying out metabolic waste; decreases cortisol; soothes and calms emotions.

#### Question 2

What are some massage modalities? List as many as you are aware of.  
Example correct responses: <http://amta-wa.org/?page=massagemodalities>

#### Question 3

How is Massage Therapy different from Physical Therapy?  
Example correct responses: Physical Therapy (PT) requires much more education; PT education includes less hands-on manipulation of tissues; The client/patient is often more a passive recipient of massage, and more an active participant in PT; PT more often includes “homework”; PT uses strengthening and stretching/massage manipulates tissues.

#### Question 4

How many hours of supervised education are required for a massage therapist to become licensed in the state of Iowa (LMT)?  
Example correct responses: 500 hours

#### Question 5

What conditions most commonly lead people to Massage Therapy?  
Example correct responses: Stress; Tension; Anxiety; Athletes hoping to prevent injury; Back, neck and hip pain

## Question 6

What are some conditions/situations that would lead you to NOT recommend massage therapy for a patient?

Example correct responses: Some form of massage can safely be used for some purposes regardless of specific contraindications. However you would not want to recommend a full-body massage for those with deep vein thrombosis, pitting edema, peripheral neuropathies, those taking strong pain-relieving medications, strong anticoagulants... without talking with the massage therapist to ensure the patient's safety.

## Question 7

Are you aware of any journals for peer-reviewed scientific research on Massage Therapy?

Example correct responses: International Journal of Therapeutic Massage and Bodywork; Journal of Bodywork and Movement Therapies

## Question 8

How does referral, collaboration and documentation work between allopathic physicians and massage therapists?

Example correct responses: Physicians and Massage therapists who want to work together toward patient health will do well to cultivate an understanding of what kinds of referral, collaboration and documentation would be helpful to each other. Talking with one another about these processes will help establish protocol and forms that will make sense and serve the patient. Challenges to this kind of discourse include major differences: in amount and variety of education; in the language we use to talk about bodies' parts, functions, dysfunctions and spatial relationships; and in our definitions of "health" and "care."

## Question 9

How do the philosophies of massage therapy and conventional medicine support or conflict with each other?

Example correct responses: Support: Both massage therapy and conventional medicine value trying least invasive therapies first, doing no harm, honoring the patient with patient-centered processes and clear communications. We both hope to help the patient achieve health.

Conflict: Massage therapists often work more within a framework of support for the whole self of the patient as they try to find their own personal path towards health and comfort. This framework often includes a belief that with proper support a person will fluctuate within an acceptable range of healthiness that will not require medication. On the other hand, conventional medicine often seeks to find and apply diagnoses and drug-based treatments for the issue(s) presented, aiming for control of the body's process that seem to be malfunctioning with long-term medications and procedures.



## Question 10

What is the cost of massage therapy? What are the options for patients who cannot afford it?

Example correct responses: One hour of massage therapy in Iowa City ranges from \$30 for student massage at the local massage college to \$85 for experienced licensed massage therapy. 90 minutes of professional massage costs between \$85 and \$110. Many massage therapists will barter or use a reduced fee scale for certain populations (cancer patients/caregivers, seniors, students, regular clients) and offer package deals.

Items on this survey were authored by Darren Hoffmann and Dede Dancing or:

Kligler et al. Suggested curriculum guidelines on complementary and alternative medicine: Recommendations of the society of teachers of family medicine group on alternative medicine. Family Medicine. 2000. 31(10):30-33.

Items in this assessment have multiple possible correct answers. To score the assessment 1 point is awarded for each accurate element of the response. Inaccurate elements of the response do not count against the overall score.

## Supplemental Digital Appendix 4

### Massage Therapy Attitudes Assessment, From a Study of Musculoskeletal Anatomy and Massage Therapy Coursework, University of Iowa College of Medicine, 2014

This survey asks you to provide your candid opinions about massage therapy (based on what you know now), as well as your past experiences with massage therapy and other complementary and alternative medical therapies. Your responses will be deidentified, feel free to respond with total honesty. You can save this survey and come back to it at any time during the survey period.

Please evaluate this series of statements on the Agreement scale

#		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Instruction in massage therapy will benefit my future work as a physician/physician assistant.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Clinical care should integrate the best of conventional and complementary and alternative medical practices such as massage therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Massage therapy includes ideas and methods from which conventional medicine could benefit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	Massage therapy holds promise for treatment of symptoms, conditions and/or diseases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	The results of massage therapy are in most cases due to placebo effect.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	Massage therapies not tested in a scientific manner should be discouraged.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	Massage therapy is a threat to public health.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	I hope to have massage therapy referral available to patients in my practice or network.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>9</b>	Health professionals should be able to advise their patients about massage therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>10</b>	Massage therapy should be included in my school's curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>11</b>	Knowledge about massage therapy is important to me as a student/future health professional.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>12</b>	I am knowledgeable in the principles and philosophy of massage therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>13</b>	I am knowledgeable in the indications for referral for massage therapy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>14</b>	I am knowledgeable in methods for integrating massage therapy in care plans for patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>15</b>	I am knowledgeable in the role of self-care in my professional and personal life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Have you ever had any instruction or exposure to Massage therapy in your education to date or in a previous/current work experience? If yes, please describe your experience briefly.

Which of the following complementary and alternative medical therapies have YOU used personally? Check as many as apply. (If you don't know what one of these therapies is, the answer is probably no)

Question options:

<input type="checkbox"/>	Aromatherapy
<input type="checkbox"/>	Homeopathy
<input type="checkbox"/>	Hypnotherapy
<input type="checkbox"/>	Acupuncture
<input type="checkbox"/>	Reflexology
<input type="checkbox"/>	Massage Therapy
<input type="checkbox"/>	Alexander Technique
<input type="checkbox"/>	Chiropractic
<input type="checkbox"/>	Herbal medicine

<input type="checkbox"/>	Kinesiology
<input type="checkbox"/>	Physiotherapy
<input type="checkbox"/>	Meditation
<input type="checkbox"/>	Creative therapies (Art, Dance, Music)
<input type="checkbox"/>	Diet/Nutritional therapies
<input type="checkbox"/>	Magnetic healing
<input type="checkbox"/>	Qi Gong
<input type="checkbox"/>	Relaxation techniques
<input type="checkbox"/>	Prayer
<input type="checkbox"/>	Therapeutic touch
<input type="checkbox"/>	Tonic products (Omega 3, Chicken essence, etc.)

To your knowledge, which of the following complementary and alternative medical therapies have been used by MEMBERS OF YOUR FAMILY? Check all that apply.

Question options:

<input type="checkbox"/>	Aromatherapy
<input type="checkbox"/>	Homeopathy
<input type="checkbox"/>	Hypnotherapy
<input type="checkbox"/>	Acupuncture
<input type="checkbox"/>	Reflexology
<input type="checkbox"/>	Massage therapy
<input type="checkbox"/>	Alexander technique
<input type="checkbox"/>	Chiropractic
<input type="checkbox"/>	Herbal medicine
<input type="checkbox"/>	Kinesiology
<input type="checkbox"/>	Physiotherapy
<input type="checkbox"/>	Meditation
<input type="checkbox"/>	Creative therapies (Art, Dance, Music)
<input type="checkbox"/>	Diet/Nutritional therapies
<input type="checkbox"/>	Magnetic healing

<input type="checkbox"/>	Qi Gong
<input type="checkbox"/>	Relaxation techniques
<input type="checkbox"/>	Prayer
<input type="checkbox"/>	Therapeutic touch
<input type="checkbox"/>	Tonic Products (Omega 3, Chicken essence, etc.)

Assessment Items on this survey are from:

Chaterji et al. A large-sample survey of first- and second-year medical student attitudes toward complementary and alternative medicine in the curriculum and in practice. *Alternative Therapies*. 2007. 13(1): 30-35.

Krietzer et al. Attitudes toward CAM among medical, nursing, and pharmacy faculty and students: a comparative analysis. *Alternative Therapies*. 2002. 8(6):44-53.

Torkelson et al. Evaluation of a complementary and alternative medicine rotation in medical school. *Alternative Therapies*. 2006. 12(4): 30-34.

Forjuoh et al. Teaching medical students complementary and alternative medicine using evidence-based principles. *The Journal of Alternative and Complementary Medicine*. 2003. 9(3):429-439.

## Supplemental Digital Appendix 5

### Course Reflection Survey, From a Study of Musculoskeletal Anatomy and Massage Therapy Coursework, University of Iowa College of Medicine, 2014

1. What were your hopes and expectations when you signed up for this course?
2. Were your expectations met?
3. Was participation in this course worthwhile? If yes, in what way? If no, why not?
4. How much did payment for the course influence your desire to sign up? (Not at all, A little, A fair amount, I wouldn't have signed up without it, It was the whole reason)
5. Do you feel that your participation in the course affected your understanding of Anatomy? If yes, in what way? If no, why not?
6. Do you feel that your participation in this course affected your approach to the physical exam? If yes, in what way? If no, why not?
7. Do you feel that your participation in this course has affected or will affect your interactions with patients (communication skills, empathy, referrals, etc.)? If yes, in what way, if no, why not?
8. Do you feel that your participation in this course has affected or will affect the way that you will touch patients (either in the context of physical exam or offering comfort and connection)? If yes, in what way? If no, why not?
9. Do you feel that your participation in this course will affect your future interactions with members of the interprofessional health care team? If yes, in what way? If no, why not?
10. Do you feel that your participation in this course has had an impact on your life? If yes, in what way? If no, why not?
11. Did you try using any of the skills learned in this class to give massage outside of class? If so, what was the outcome? Were you able to use any of these techniques for self-massage and/or relaxation?
12. If this course is offered in the future, do you think this course should be offered to the entire class? If yes, why? If no, why not?
13. If only parts of the course could be offered in the future, what are the most important elements to keep?
14. Are there other CAM (complementary and alternative medicine) practices that you think would be helpful to learn more about in this type of experiential course?
15. Are you interested in pursuing Massage Therapy study later in your curriculum? If yes, what type of program would that be?
16. In retrospect, do you wish you would have been in the other study group (online vs. hands-on)? Why or why not?
17. Do you have any other thoughts or opinions about this course that you'd like to share that we haven't asked about?