Ethics of AI in Radiology: Double and Multiple Considerations Facing Medical Professionals Identified in Regulatory Documents, Guidelines, and Literature

Ameen Abdel Razek Abdalla 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22,4223,4224,4225,4226,4227,4228,4229,4230,4231,4232,4233,4234,4235,4236,4237,4238,4239,4240,4241,4242,4243,4244,4245,4246,4247,4248,4249,4250,4251,4252,4253,4254,4255,4256,4257,4258,4259,4260,4261,4262,4263,4264,4265,4266,4267,4268,4269,4270,4271,4272,4273,4274,4275,4276,4277,4278,4279,4280,4281,4282,4283,4284,4285,4286,4287,4288,4289,4290,4291,4292,4293,4294,4295,4296,4297,4298,4299,4300,4301,4302,4303,4304,4305,4306,4307,4308,4309,4310,4311,4312,4313,4314,4315,4316,4317,4318,4319,4320,4321,4322,4323,4324,4325,4326,4327,4328,4329,4330,4331,4332,4333,4334,4335,4336,4337,4338,4339,4340,4341,4342,4343,4344,4345,4346,4347,4348,4349,4350,4351,4352,4353,4354,4355,4356,4357,4358,4359,4360,4361,4362,4363,4364,4365,4366,4367,4368,4369,4370,4371,4372,4373,4374,4375,4376,4377,4378,4379,4380,4381,4382,4383,4384,4385,4386,4387,4388,4389,4390,4391,4392,4393,4394,4395,4396,4397,4398,4399,4400,4401,4402,4403,4404,4405,4406,4407,4408,4409,4410,4411,4412,4413,4414,4415,4416,4417,4418,4419,4420,4421,4422,4423,4424,4425,4426,4427,4428,4429,4430,4431,4432,4433,4434,4435,4436,4437,4438,4439,4440,4441,4442,4443,4444,4445,4446,4447,4448,4449,4450,4451,4452,4453,4454,4455,4456,4457,4458,4459,4460,4461,4462,4463,4464,4465,4466,4467,4468,4469,4470,4471,4472,4473,4474,4475,4476,4477,4478,4479,4480,4481,4482,4483,4484,4485,4486,4487,4488,4489,4490,4491,4492,4493,4494,4495,4496,4497,4498,4499,4500,4501,4502,4503,4504,4505,4506,4507,4508,4509,4510,4511,4512,4513,4514,4515,4516,4517,4518,4519,4520,4521,4522,4523,4524,4525,4526,4527,4528,4529,4530,4531,4532,4533,4534,4535,4536,4537,4538,4539,4540,4541,4542,4543,4544,4545,4546,4547,4548,4549,4550,4551,4552,4553,4554,4555,4556,4557,4558,4559,4560,4561,4562,4563,4564,4565,4566,4567,4568,4569,4570,4571,4572,4573,4574,4575,4576,4577,4578,4579,4580,4581,4582,4583,4584,4585,4586,4587,4588,4589,4590,4591,4592,4593,4594,4595,4596,4597,4598,4599,4600,4601,4602,4603,4604,4605,4606,4607,4608,4609,4610,4611,4612,4613,4614,4615,4616,4617,4618,4619,4620,4621,4622,4623,4624,4625,4626,4627,4628,4629,4630,4631,4632,4633,4634,4635,4636,4637,4638,4639,4640,4641,4642,4643,4644,4645,4646,4647,4648,4649,4650,4651,4652,4653,4654,4655,4656,4657,4658,4659,4660,4661,4662,4663,4664,4665,4666,4667,4668,4669,4670,4671,4672,4673,4674,4675,4676,4677,4678,4679,4680,4681,4682,4683,4684,4685,4686,4687,4688,4689,4690,4691,4692,4693,4694,4695,4696,4697,4698,4699,4700,4701,4702,4703,4704,4705,4706,4707,4708,4709,4710,4711,4712,4713,4714,4715,4716,4717,4718,4719,4720,4721,4722,4723,4724,4725,4726,4727,4728,4729,4730,4731,4732,4733,4734,4735,4736,4737,4738,4739,4740,4741,4742,4743,4744,4745,4746,4747,4748,4749,4750,4751,4752,4753,4754,4755,4756,4757,4758,4759,4760,4761,4762,4763,4764,4765,4766,4767,4768,4769,4770,4771,4772,4773,4774,4775,4776,4777,4778,4779,4780,4781,4782,4783,4784,4785,4786,4787,4788,4789,4790,4791,4792,4793,4794,4795,4796,4797,4798,4799,4800,4801,4802,4803,4804,4805,4806,4807,4808,4809,4810,4811,4812,4813,4814,4815,4816,4817,4818,4819,4820,4821,4822,4823,4824,4825,4826,4827,4828,4829,4830,4831,4832,4833,4834,4835,4836,4837,4838,4839,4840,4841,4842,4843,4844,4845,4846,4847,4848,4849,4850,4851,4852,4853,4854,4855,4856,4857,4858,4859,4860,4861,4862,4863,4864,4865,4866,4867,4868,4869,4870,4871,4872,4873,4874,4875,4876,4877,4878,4879,4880,4881,4882,4883,4884,4885,4886,4887,4888,4889,4890,4891,4892,4893,4894,4895,4896,4897,4898,4899,4900,4901,4902,4903,4904,4905,4906,4907,4908,4909,4910,4911,4912,4913,4914,4915,4916,4917,4918,4919,4920,4921,4922,4923,4924,4925,4926,4927,4928,4929,4930,4931,4932,4933,4934,4935,4936,4937,4938,4939,4940,4941,4942,4943,4944,4945,4946,4947,4948,4949,4950,4951,4952,4953,4954,4955,4956,4957,4958,4959,4960,4961,4962,4963,4964,4965,4966,4967,4968,4969,4970,4971,4972,4973,4974,4975,4976,4977,4978,4979,4980,4981,4982,4983,4984,4985,4986,4987,4988,4989,4990,4991,4992,4993,4994,4995,4996,4997,4998,4999,5000,5001,5002,5003,5004,5005,5006,5007,5008,5009,5010,5011,5012,5013,5014,5015,5016,5017,5018,5019,5020,5021,5022,5023,5024,5025,5026,5027,5028,5029,5030,5031,5032,5033,5034,5035,5036,5037,5038,5039,5040,5041,5042,5043,5044,5045,5046,5047,5048,5049,5050,5051,5052,5053,5054,5055,5056,5057,5058,5059,5060,5061,5062,5063,5064,5065,5066,5067,5068,5069,5070,5071,5072,5073,5074,5075,5076,5077,5078,5079,5080,5081,5082,5083,5084,5085,5086,5087,5088,5089,5090,5091,5092,5093,5094,5095,5096,5097,5098,5099,5100,5101,5102,5103,5104,5105,5106,5107,5108,5109,5110,5111,5112,5113,5114,5115,5116,5117,5118,5119,5120,5121,5122,5123,5124,5125,5126,5127,5128,5129,5130,5131,5132,5133,5134,5135,5136,5137,5138,5139,5140,5141,5142,5143,5144,5145,5146,5147,5148,5149,5150,5151,5152,5153,5154,5155,5156,5157,5158,5159,5160,5161,5162,5163,5164,5165,5166,5167,5168,5169,5170,5171,5172,5173,5174,5175,5176,5177,5178,5179,5180,5181,5182,5183,5184,5185,5186,5187,5188,5189,5190,5191,5192,5193,5194,5195,5196,5197,5198,5199,5200,5201,5202,5203,5204,5205,5206,5207,5208,5209,5210,5211,5212,5213,5214,5215,5216,5217,5218,5219,5220,5221,5222,5223,5224,5225,5226,5227,5228,5229,5230,5231,5232,5233,5234,5235,5236,5237,5238,5239,5240,5241,5242,5243,5244,5245,5246,5247,5248,5249,5250,5251,5252,5253,5254,5255,5256,5257,5258,5259,5260,5261,5262,5263,5264,5265,5266,5267,5268,5269,5270,5271,5272,5273,5274,5275,5276,5277,5278,5279,5280,5281,5282,5283,5284,5285,5286,5287,5288,5289,5290,5291,5292,5293,5294,5295,5296,5297,5298,5299,5300,5301,5302,5303,5304,5305,5306,5307,5308,5309,5310,5311,5312,5313,5314,5315,5316,5317,5318,5319,5320,5321,5322,5323,5324,5325,5326,5327,5328,5329,5330,5331,5332,5333,5334,5335,5336,5337,5338,5339,5340,5341,5342,5343,5344,5345,5346,5347,5348,5349,5350,5351,5352,5353,5354,5355,5356,5357,5358,5359,5360,5361,5362,5363,5364,5365,5366,5367,5368,5369,5370,5371,5372,5373,5374,5375,5376,5377,5378,5379,5380,5381,5382,5383,5384,5385,5386,5387,5388,5389,5390,5391,5392,5393,5394,5395,5396,5397,5398,5399,5400,5401,5402,5403,5404,5405,5406,5407,5408,5409,5410,5411,5412,5413,5414,5415,5416,5417,5418,5419,5420,5421,5422,5423,5424,5425,5426,5427,5428,5429,5430,5431,5432,5433,5434,5435,5436,5437,5438,5439,5440,5441,5442,5443,5444,5445,5446,5447,5448,5449,5450,5451,5452,5453,5454,5455,5456,5457,5458,5459,5460,5461,5462,5463,5464,5465,5466,5467,5468,5469,5470,5471,5472,5473,5474,5475,5476,5477,5478,5479,5480,5481,5482,5483,5484,5485,5486,5487,5488,5489,5490,5491,5492,5493,5494,5495,5496,5497,5498,5499,5500,5501,5502,5503,5504,5505,5506,5507,5508,5509,5510,5511,5512,5513,5514,5515,5516,5517,5518,5519,5520,5521,5522,5523,5524,5525,5526,5527,5528,5529,5530,5531,5532,5533,5534,5535,5536,5537,5538,5539,5540,5541,5542,5543,5544,5545,5546,5547,5548,5549,5550,5551,5552,5553,5554,5555,5556,5557,5558,5559,5560,5561,5562,5563,5564,5565,5566,5567,5568,5569,5570,5571,5572,5573,5574,5575,5576,5577,5578,5579,5580,5581,5582,5583,5584,5585,5586,5587,5588,5589,5590,5591,5592,5593,5594,5595,5596,5597,5598,5599,5600,5601,5602,5603,5604,5605,5606,5607,5608,5609,5610,5611,5612,5613,5614,5615,5616,5617,5618,5619,5620,5621,5622,5623,5624,

Table 1.

Ventricular Tachycardia

Arrhythmia Type	Private	Commercial
Nonsustained ventricular tachycardia	B_3,* A†	B_6,* A†
Sustained ventricular tachycardia	B_6, B_3‡	C, B_6‡
Ventricular fibrillation	B_6	C

- A indicates no restrictions; B, restriction for defined period of months, indicated as subscript to document an arrhythmia-free interval after initiation of therapy (whether implantable cardioverter-defibrillator, antiarrhythmic drug, or both); C, total restriction with presenting arrhythmia.

  *Symptoms of impaired consciousness with arrhythmia (before treatment).

  †No impairment of consciousness with arrhythmia.

  ‡Idiopathic ventricular tachycardia (normal coronary arteries, normal ventricular function) and no impairment of consciousness.

  Arrhythmia type refers to arrhythmias occurring with no apparent reversible cause; for example, ventricular fibrillation in the setting of acute myocardial infarction, severe electrolyte abnormality, drug toxicity, or electrocution would be excluded.

Table 2.

Supraventricular Tachycardia

Condition	Private or Commercial
Asymptomatic or minimally symptomatic SVT (including WPW syndrome)	A
Symptomatic* SVT	B†
Atrial fibrillation treated by catheter ablation of AV node	B (see guidelines for pacing)
SVT with uncontrolled symptoms	C

- SVT indicates supraventricular tachycardia; WPW, Wolff-Parkinson-White; AV, atrioventricular; A, no restrictions; B, restriction for defined period of months, indicated as subscript to document an arrhythmia-free interval after initiation of therapy (whether implantable cardioverter-defibrillator, antiarrhythmic drug, or both); C, total restriction with presenting arrhythmia.

  *Symptomatic: evidence of hemodynamic compromise such as syncope, presyncope, chest pain, or dyspnea; palpitations alone are not sufficient.

  †Restrictions until after initiation of therapy that eliminates symptoms. Patients with supraventricular tachycardia that appears to be successfully ablated can drive after recovery from the procedure. Patients treated with drug therapy should as a minimum have a 1-month symptom-free period before resuming driving, depending on pretherapy frequency of tachycardia.

Table 3.

Bradycardia With and Without Cardiac Pacing

Condition	Noncommercial	Commercial
No symptoms No pacemaker	A	A
Syncope or near syncope No pacemaker	C	C
Not pacemaker-dependent* Yes, pacemaker	A	A
Pacemaker-dependent* Yes, pacemaker	B—1 wk	B—4 wk

- A indicates no driving restrictions; B, driving permitted after controlled arrhythmia is documented for a specified period of time and an adequate pacemaker follow-up regimen is followed; C, driving completely prohibited.

  *For these purposes, "pacemaker-dependent" is defined as patients who have lost consciousness in the past due to bradyarrhythmias. It may also include patients immediately after atrioventricular junction ablation or any other patient in whom sudden pacemaker failure would be likely to result in alteration of consciousness.

Table 4.

Neurally Mediated Syncope and Presyncope

	Private	Commercial
VVS mild	A	B_1
VVS severe		
Treated	B_3	B_6
Untreated	C	C
CSS mild	A	A
CSS severe		
Treated with control	B_1	B_1
Treated with uncertain control	B_3	B_6
Untreated	C	C

- VVS indicates vasovagal syncope or presyncope; CSS, carotid sinus syncope or presyncope (mild and severe forms are defined in text); control, pause less than 3 sec with decrease in systolic blood pressure ≤10 mm Hg with carotid sinus massage after therapy; A, no driving restrictions; B, driving permitted after controlled arrhythmia is documented for a specified period of time and an adequate pacemaker follow-up regimen is followed; C, driving completely prohibited.