Appendix: Tables and Figures

Appendix A

Table A1
National Facility-Level Score Distribution for #0676 Percent of Residents Who Self-Report Moderate to Severe Pain (Short Stay)

k	Mean score	Std dev.	10th percentile	20th percentile	30th percentile	40th percentile	50th percentile	60th percentile	70th percentile	80th percentile	90th percentile	% of facilities with "perfect scores"	Interquartile range
11,945	12.7%	10.6%	0.7%	3.2%	5.3%	8.0%	10.5%	13.6%	16.9%	21.1%	27.3%	9.0%	14.6%

NOTES:

k = number of facilities that meet minimum requirements for public reporting this quality measure.

SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (db361_request_q2627_676.log; db362_request_q2627_676.log)

Figure A1

Mean and Median Facility-Level Scores by Quarter for #0676 Percent of Residents Who Self-Report Moderate to Severe Pain (Short Stay)
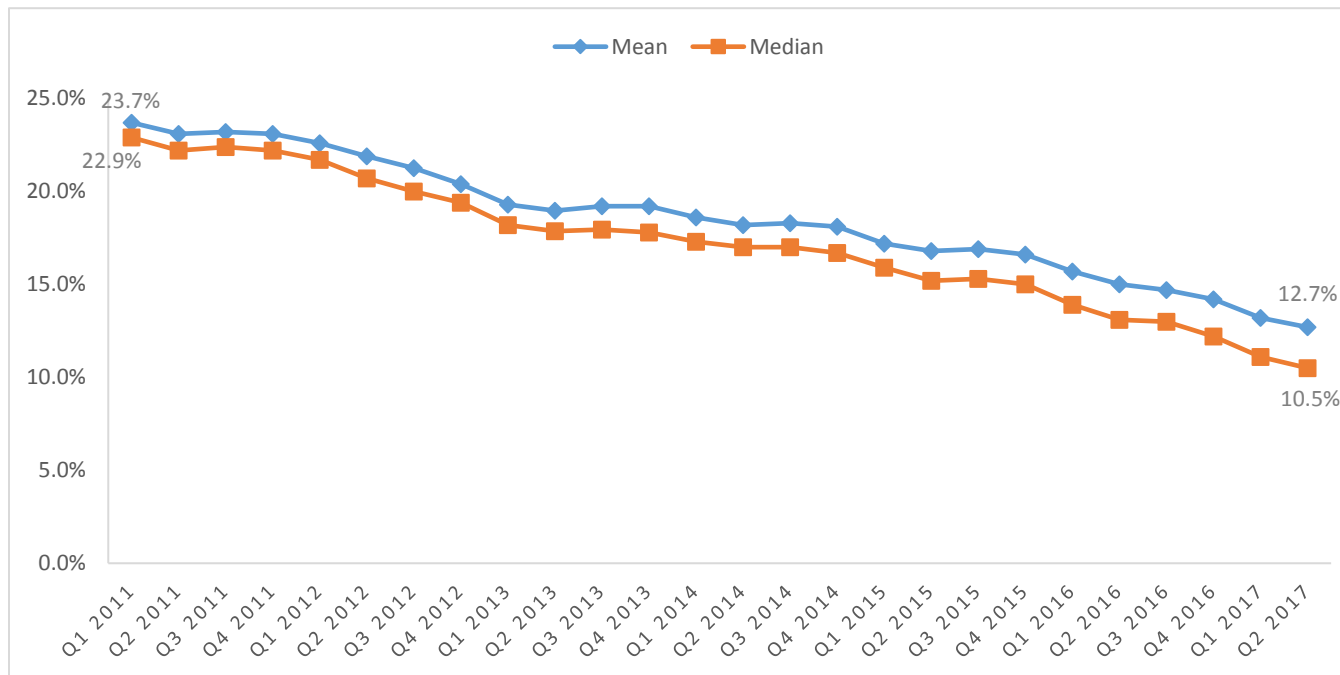
SOURCE: RTI analysis of MDS 3.0 episode files for Quarter 1, 2011–Quarter 2, 2017

Table A2

Percentage of Residents Included in the Numerator of QM #0676 Percent of Residents Who Self-Report Moderate to Severe Pain (Short Stay) by Racial Identification

Race	n	Mean	SD	F
Asian	26,758	7.7%	26.7%	328.56*
Hispanic	53,803	8.8%	28.3%	—
Black	123,272	11.5%	31.9%	—
White	929,704	12.6%	33.2%	—
Missing (no race data)	43,989	11.6%	32.1%	—
Total	1,177,526	12.2%	32.7%	—

*$p < .0001$

SOURCE: RTI analysis of MDS 3.0 episode file for Quarter 2, 2017 (av13_request_q2627_676.log)

Table A3
Facility-Level Score for #0676 Percent of Residents Who Self-Report Moderate to Severe Pain (Short Stay), Stratified by Median Proportion of Non-White Residents

Facility Characteristic	K	Mean	SD	F
≤ 88.2% White (>11.8% Non-White or missing racial ID data)	5,988	11.5%	10.6%	151.48*
> 88.2% White (≤ 11.8% Non-White or missing racial ID data)	5,957	13.9%	10.4%	—
Total	11,945	12.7%	10.6%	—

*$p < .0001$

SOURCE: RTI analysis of MDS 3.0 episode file for Quarter 2, 2017 (av13_request_q2627_676.log)

Table A4 Percentage of Residents Included in the Numerator of #0676 Percent of Residents Who Self-Report Moderate to Severe Pain (Short Stay) by Racial Identification, Quarter 1, 2015 – Quarter 2, 2017

		Q1 2015	Q2 2015	Q3 2016	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017
Asian	**Mean**	10.6%	10.6%	10.7%	10.5%	10.0%	9.2%	9.2%	8.8%	8.5%	7.7%
	SD	30.8%	30.8%	30.9%	30.7%	30.0%	28.9%	28.8%	28.3%	27.9%	26.7%
	N	22,720	23,185	23,264	23,525	24,028	24,249	24,551	24,816	26,256	26,758
Hispanic	**Mean**	14.3%	13.8%	13.8%	13.2%	12.1%	11.1%	11.0%	10.3%	9.3%	8.8%
	SD	35.0%	34.5%	34.5%	33.8%	32.6%	31.4%	31.3%	30.4%	29.0%	28.3%
	N	48,635	49,432	50,431	49,729	49,545	50,169	51,889	51,576	52,514	53,803
Black	**Mean**	16.2%	16.0%	16.0%	15.3%	14.5%	13.8%	13.6%	13.0%	12.2%	11.5%
	SD	36.9%	36.6%	36.7%	36.0%	35.2%	34.5%	34.2%	33.7%	32.7%	31.9%
	N	108,592	111,377	113,935	114,535	116,804	117,559	118,929	118,438	121,620	123,272
White	**Mean**	17.2%	16.7%	16.8%	16.6%	15.6%	14.9%	14.7%	14.2%	13.1%	12.6%
	SD	37.8%	37.3%	37.4%	37.2%	36.3%	35.6%	35.4%	34.9%	33.8%	33.2%
	N	889,808	897,917	880,047	876,303	893,065	895,611	887,849	885,251	923,242	929,704
Missing	**Mean**	16.6%	15.7%	15.8%	15.4%	14.4%	13.6%	13.5%	13.0%	12.1%	11.6%
	SD	37.2%	36.4%	36.5%	36.0%	35.1%	34.3%	34.2%	33.6%	32.6%	32.1%
	N	42,067	40,285	38,670	39,156	40,150	40,694	41,335	42,219	43,651	43,989
	F	244.28*	223.3*	237.85*	265.62*	267.86*	305.5*	297.65*	311.81*	288.1*	328.56*

*$p < .0001$

SOURCE: RTI analysis of MDS 3.0 episode file for Quarter 1, 2015 - 2, 2017 (programming reference: AV13)

Appendix B

Table B1
Transition of Publicly Reported Nursing Home Measures to MDS 3.0
Technical Expert Panel Participants (January 2009)

Name	Title	Affiliation
Barbara Anglin, RN	Program Services Consultant	American Association of Nurse Assessment Coordinators (AANAC)
Bonnie Burak-Danielson, MSM, EXP, LPTA	Rehab Manager of Reimbursement	Spaulding Rehab Network
Sarah Burger, MPH, RN	Senior Advisor and Coordinator	Coalition of Geriatric Nursing Organizations The John A. Hartford Institute for Geriatric Nursing
Diane Carter, MSN, RN, CS	President	AANAC
Kate Dennison, RN, RAC-MT	Minimum Data Set (MDS) Coordinator	The Cedars
Mary Ellard, RN, MPA/H, RAC-CT	Clinical Assessment Specialist	Five Star Quality Care, Inc.
Sandy Fitzler, RN	Senior Director of Clinical Services	American Health Care Association
David F. Hittle, PhD	Assistant Professor	Division of Health Care Policy and Research University of Colorado Denver, School of Medicine
Steve Levenson, MD, CMD	Multi-Facility Medical Director, Baltimore, MD	
Carol Maher, RN-BC, RAC-CT	Director of Clinical Reimbursement	Ensign Facilities Services
Barbara Manard, PhD	Vice President, Long Term Care/Health Strategies	American Association of Homes and Services for the Aging
Debra Saliba, MD, MPH	Anna and Harry Borun Chair in Geriatrics and Gerontology at UCLA Research Physician VA GLAHS GRECC Director of UCLA/JHA Borun Center for Gerontological Research Senior Natural Scientist RAND Health	University of California, Los Angeles (UCLA), Veterans Affairs (VA), RAND Corporation

Eric Tangalos, MD	Professor of Medicine	Mayo Clinic
Jacqueline Vance, RNC, CDONA/LTC	Director of Clinical Affairs	(American Medical Directors Association) AMDA
Mary Van de Kamp, MS/CCC-SLP	Vice President, Clinical Rehabilitation	People*first* Rehabilitation
Charlene Harrington, PhD, RN, FAAN*	Professor Emeritus	University of California, San Francisco Fellow in the American Academy of Nursing

Appendix C

RTI has conducted additional analyses to examine the item- and measure-level validity for both the short-stay pain measure (NQF #0676) and the long-stay pain measure (NQF #0677) using available data. At the item level, we examined how effect of pain on function varies by self-reported pain intensity. At the measure level, we examined the relationship between the effect of pain on function and triggering the numerator of the respective measures.

Item-Level Analyses

At the item-level, we examined how the percentage of residents whose pain impacted their function (MDS items J0500A and J0500B) varied by pain intensity (as measured by the verbal descriptor scale and 0-10 numeric scale in Minimum Data Set (MDS) item J0600: Pain Intensity). Pain Effect on Function items assess the impact of pain on residents' sleep and day-to-day activities: "Over the past five days, has pain made it hard for you to sleep at night?" (J0500A) and "Over the past five days, have you limited your day-to-day activities because of pain?" (J0500B). Please note that the MDS 3.0 items assessing Pain Effect on Function (J0500A/B) are required only for those persons reporting any pain (J0300=1); as such, the sample used in this analysis is limited to those individuals who do not meet measure exclusion criteria and where J0300=1. Full text of items J0300 to J0600 are included as ***Figure C5***.

Short-Stay

Among the 1,177,526 short-stay residents who do not meet exclusion criteria for the short-stay pain measure, 48.3% (568,627) reported presence of any pain (J0300 = 1). ***Figure C1*** below shows the percentage of short-stay residents with any pain who noted that their pain made it hard for them to sleep (J0500A=1) among those who reported mild (0-4), moderate (5-7), severe (8-9) or very severe (10) pain intensity. Similarly, ***Figure C2*** shows the percentage of short-stay residents with any pain who noted that their pain limited their day-to-day activities (J0500B=1) among those who reported mild (0-4), moderate (5-7), severe (8-9) or very severe (10) pain intensity. ***Figures C1*** and C***2*** illustrate that as pain severity increased, so did the percentage of residents reporting that their pain impacted function. For example, among short-stay residents who self-reported mild pain intensity (0-4 on the numeric scale), 10.1% indicated that the pain limited their ability to perform day-to-day activities. In comparison, this percentage increased to 61.3% for short-stay residents who self-reported very severe pain (10 on the numeric scale).

Figure C1. Percentage of Residents Whose Pain Impacts Resident Ability to Sleep at Night by Pain Intensity (Short-Stay)
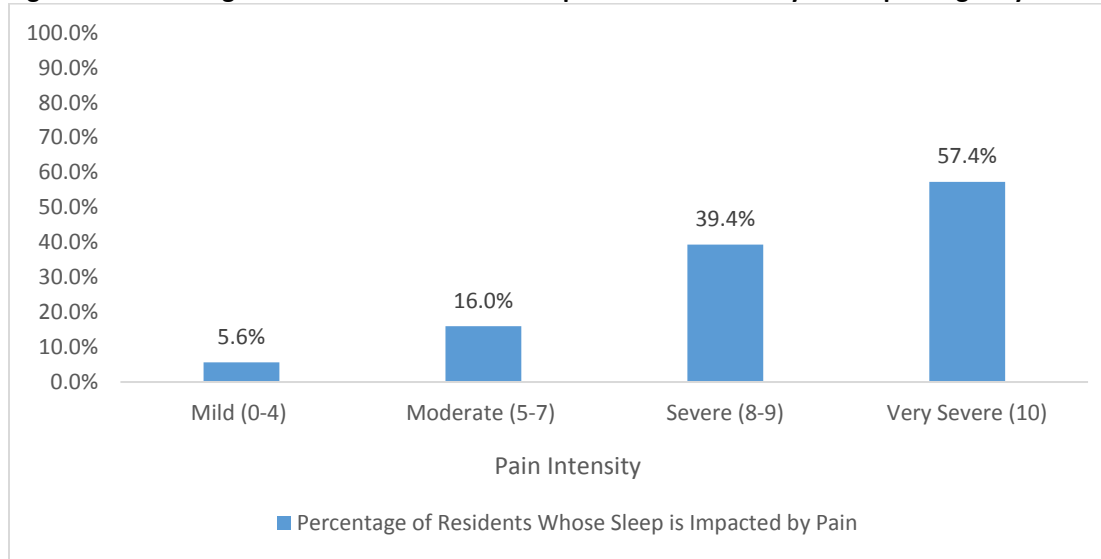
Note: Those with missing data are excluded from this analysis.

SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (programming reference: av15_request_q_26_27.log)

Figure C2. Percentage of Residents Whose Pain Impacts Ability to Perform Day-to-Day Activities by Pain Intensity (Short-Stay)
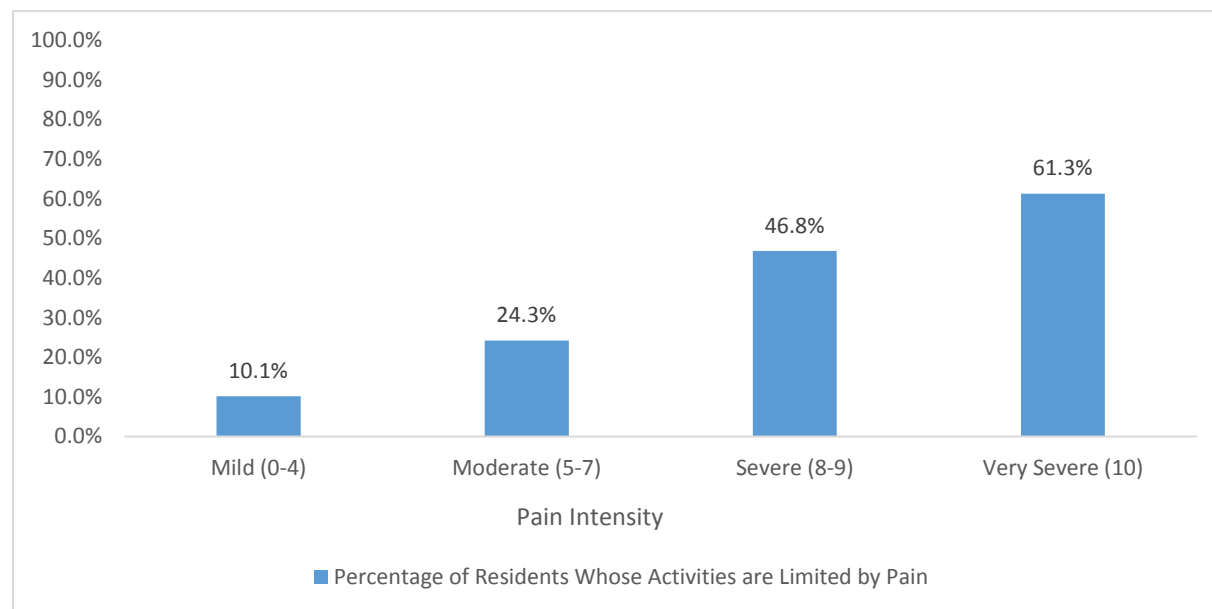
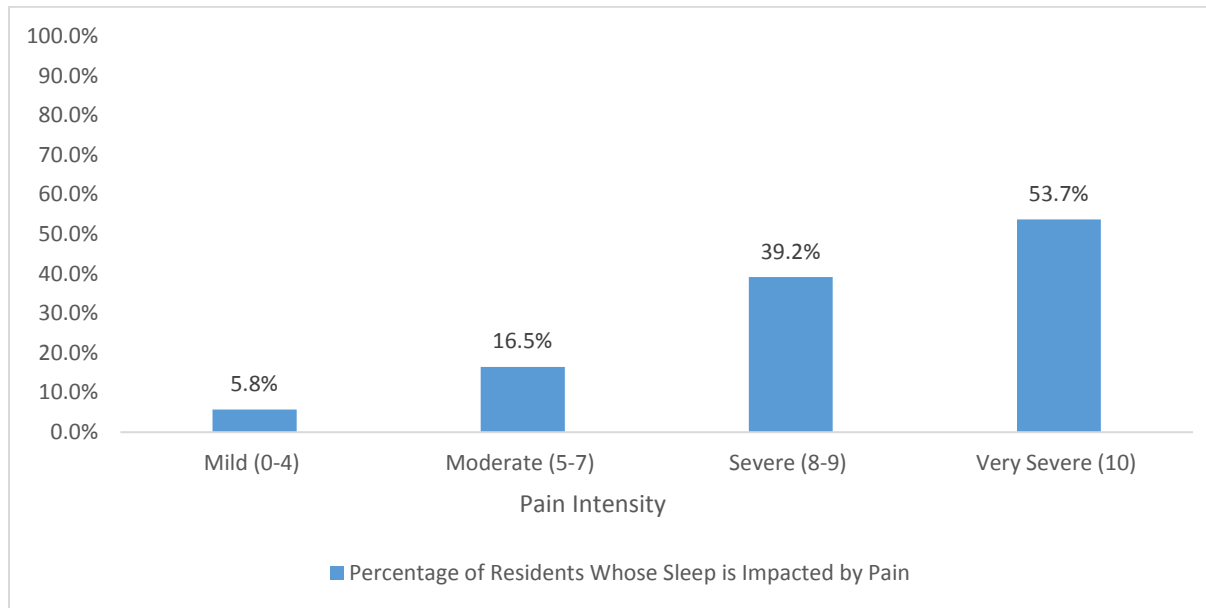Note: Those with missing data are excluded from this analysis.
SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (programming reference: av15_request_q_26_27.log)

Long-Stay

We observed that, among the 838,842 long-stay residents who do not meet exclusion criteria for the long-stay pain measure, 26.4% (221,253) reported presence of any pain (J0300 = 1). Please note that the MDS 3.0 items assessing pain effect on function (J0500A and J0500B) are required only for those persons reporting any pain (J0300=1); as such, the sample used in this analysis is limited to those individuals where J0300=1.

Figure C3 below shows the percentage of long-stay residents with any pain who noted that their pain made it hard for them to sleep (J0500A=1) among those who reported mild (0-4), moderate (5-7), severe (8-9) or very severe (10) pain intensity. Similarly, **Figure C4** shows percentage of long-stay residents with any pain who noted that their pain limited their day-to-day activities (J0500B=1) among those who reported mild (0-4), moderate (5-7), severe (8-9) or very severe (10) pain intensity. **Figures C3** and C**4** illustrate that as pain severity increased, so did the percentage of residents reporting that their pain impacted their function.

Figure C3. Percentage of Residents Whose Pain Impacts Resident Ability to Sleep at Night by Pain Intensity (Long-Stay)

Note: Those with missing data are excluded from this analysis.

SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (programming reference: av15_request_q_26_27.log)

Figure C4. Percentage of Residents Whose Pain Impacts Ability to Perform Day-to-Day Activities by Pain Intensity (Long-Stay)
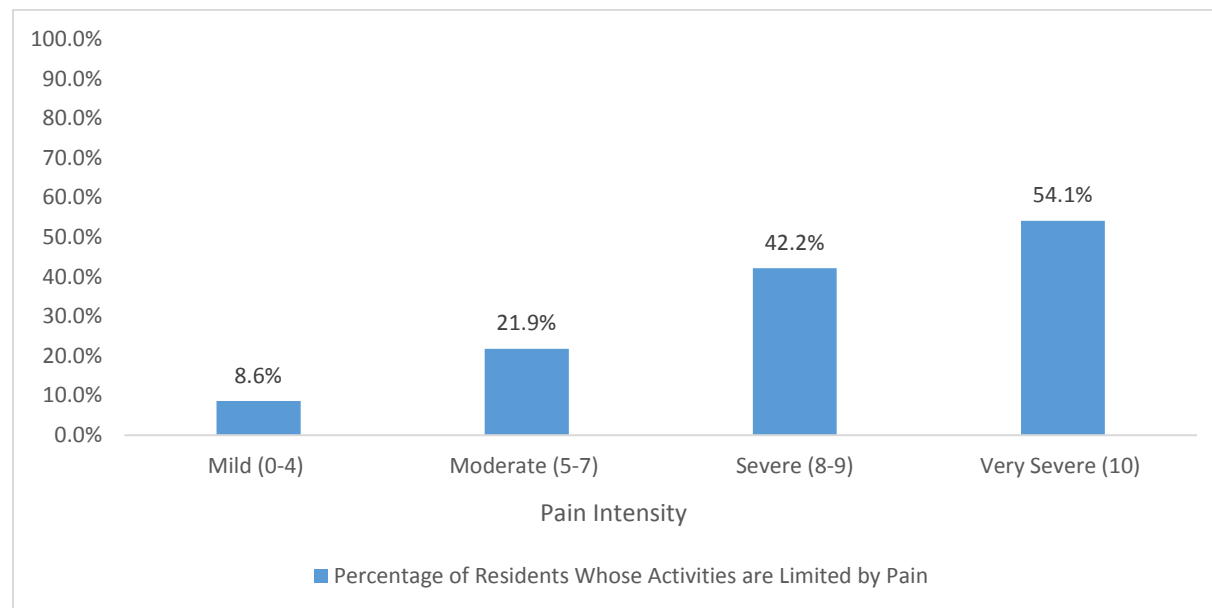
Note: Those with missing data are excluded from this analysis.
SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (programming reference: av15_request_q_26_27.log)

<u>Measure-Level Analyses</u>

Short-Stay
Using data from Quarter 2, 2017, among those short-stay residents who reported any pain, we examined the relationship between triggering the numerator of the measure (e.g. residents with either (1) almost constant or frequent moderate to severe pain or (2) any very severe/horrible) and pain effect on function. Chi-square tests were used to determine whether these differences were statistically significant (p<0.05), as shown in **Table C1.** Please note that the MDS 3.0 items assessing pain effect on function (J0500A/B) are required only for those persons reporting any pain (J0300=1); as such, the sample used in this analysis is limited to those individuals where J0300=1.

Among short-stay residents who reported pain presence, 15.4% (87,092) reported that their pain had made it hard for them to sleep at night in the past 5 days (J0500A=1), and 21.9% (123,907) reported that they had limited their day-to-day activities because of pain in the last 5 days.
Among those residents who report that their pain impacts function, there are significant differences in the proportion of residents who self-report moderate to severe pain. Specifically, among those who report that pain causes difficulty sleeping, 63.3% report moderate to severe pain versus 36.7% who do not. (χ^2(1) >79,000, *p* <.001). Similarly, among residents who reported that their pain limits day-to-day activities 54.9% report moderate to severe pain versus 45.1% who do not (χ^2(1) >74,000, *p* <.001).

Table C1. Percent of Residents Who Self-Report Moderate to Severe Pain (Short-Stay), by Pain Effect on Function

Resident Self-Reports Moderate to Severe Pain		Pain Causes Difficulty Sleeping		Pain Limits Day-to-Day Activities	
		Yes	No	Yes	No
Yes	%	63.3%	18.3%	54.9%	16.9%
	N	55,132	87,580	68,002	74,616
No	%	36.7%	81.7%	45.1%	83.1%
	N	31,960	391,880	55,905	367,781
Total	%	100.0%	100.0%	100.0%	100.0%
	N	87,092	479,460	123,907	442,397

Note: Those with missing data are excluded from this analysis.
Source: RTI analysis of MDS 3.0 Data, Q2 2017 (programming reference: AV14)

Long-Stay

Using data from Quarter 2, 2017, among those long-stay residents who reported any pain we examined the relationship between triggering the numerator of the measure (e.g. residents with either (1) almost constant or frequent moderate to severe pain or (2) any very severe/horrible pain) and pain effect on function. Chi-square tests were used to determine whether these differences were statistically significant (p<0.05), as shown in **Table C2.** Please note that the MDS 3.0 items assessing pain effect on function (J0500A/B) are required only for those persons reporting any pain (J0300=1) and as such, the sample used in this analysis is limited to those individuals where J0300=1.

Among residents who reported pain presence, 15.3% (33,625) reported that their pain had made it hard for them to sleep at night in the past 5 days (J0500A=1), and 19.1% (42,059) reported that they had limited their day-to-day activities because of pain in the last 5 days.

Among those residents who report that their pain effects functioning, there are significant differences in the proportion of residents who self-report moderate to severe pain. Specifically, among those who report that pain causes difficulty sleeping, 62.0% report moderate to severe pain versus 38.0% who do not (χ^2(1) >27,000, *p* <.001). Similarly, among residents who reported that their pain limits day-to-day activities 56.5% report moderate to severe pain versus 43.6% who do not (χ^2(1) >26,000, *p* <.001).

Table C2. Percent of Residents Who Self-Report Moderate to Severe Pain (Long-Stay), by Pain Effect on Function

Resident Self-Reports Moderate to Severe Pain		Pain Causes Difficulty Sleeping		Pain Limits Day-to-Day Activities	
		Yes	No	Yes	No
Yes	%	62.0%	19.2%	56.5%	18.5%
	N	20,852	35,887	23,742	32,840
No	%	38.0%	80.8%	43.6%	81.5%
	N	12,773	150,783	18,317	144,996
Total	%	100.0%	100.0%	100.0%	100.0%
	N	33,625	186,670	42,059	177,836

Note: Those with missing data are excluded from this analysis.
Source: RTI analysis of MDS 3.0 Data, Q2 2017 (programming reference: AV14)

In summary, these analyses support the item- and measure-level validity for both the short-stay pain measure (NQF #0676) and the long-stay pain measure (NQF #0677). At the item-level, we saw a positive, direct relationship between pain intensity and pain effect on function. Specifically, as shown in *Figures C1* through *C4*, with each increase in level of pain intensity, the proportion of residents who reported that their function was impacted by pain also increased. At the measure-level, we saw that among those residents who report that their pain impacts function, there were statistically significantly higher proportions of residents who are included in the numerator of the respective measures.

Figure C5. Pain Assessment Interview Items from the Minimum Data Set (MDS 3.0)

Pain Assessment Interview

J0300. Pain Presence

Enter Code ▢

Ask resident: "*Have you had pain or hurting at any time* in the last 5 days?"
- 0. No → Skip to J1100, Shortness of Breath
- 1. Yes → Continue to J0400, Pain Frequency
- 9. Unable to answer → Skip to J0800, Indicators of Pain or Possible Pain

J0400. Pain Frequency

Enter Code ▢

Ask resident: "*How much of the time have you experienced pain or hurting* over the last 5 days?"
- 1. Almost constantly
- 2. Frequently
- 3. Occasionally
- 4. Rarely
- 9. Unable to answer

J0500. Pain Effect on Function

Enter Code ▢

A. Ask resident: "*Over the past 5 days, has pain made it hard for you to sleep at night?*"
- 0. No
- 1. Yes
- 9. Unable to answer

Enter Code ▢

B. Ask resident: "*Over the past 5 days, have you limited your day-to-day activities because of pain?*"
- 0. No
- 1. Yes
- 9. Unable to answer

J0600. Pain Intensity - Administer **ONLY ONE** of the following pain intensity questions (A or B)

Enter Rating ▢▢

A. **Numeric Rating Scale (00-10)**
Ask resident: "*Please rate your worst pain over the last 5 days on a zero to ten scale, with zero being no pain and ten as the worst pain you can imagine.*" (Show resident 00 -10 pain scale)
Enter two-digit response. Enter 99 if unable to answer.

Enter Code ▢

B. **Verbal Descriptor Scale**
Ask resident: "*Please rate the intensity of your worst pain over the last 5 days.*" (Show resident verbal scale)
- 1. Mild
- 2. Moderate
- 3. Severe
- 4. Very severe, horrible
- 9. Unable to answer