

Appendix: Tables and Figures

Appendix A

Table A1

National Facility-Level Score Distribution for #0677 Percent of Residents Who Self-Report Moderate to Severe Pain (Long Stay)

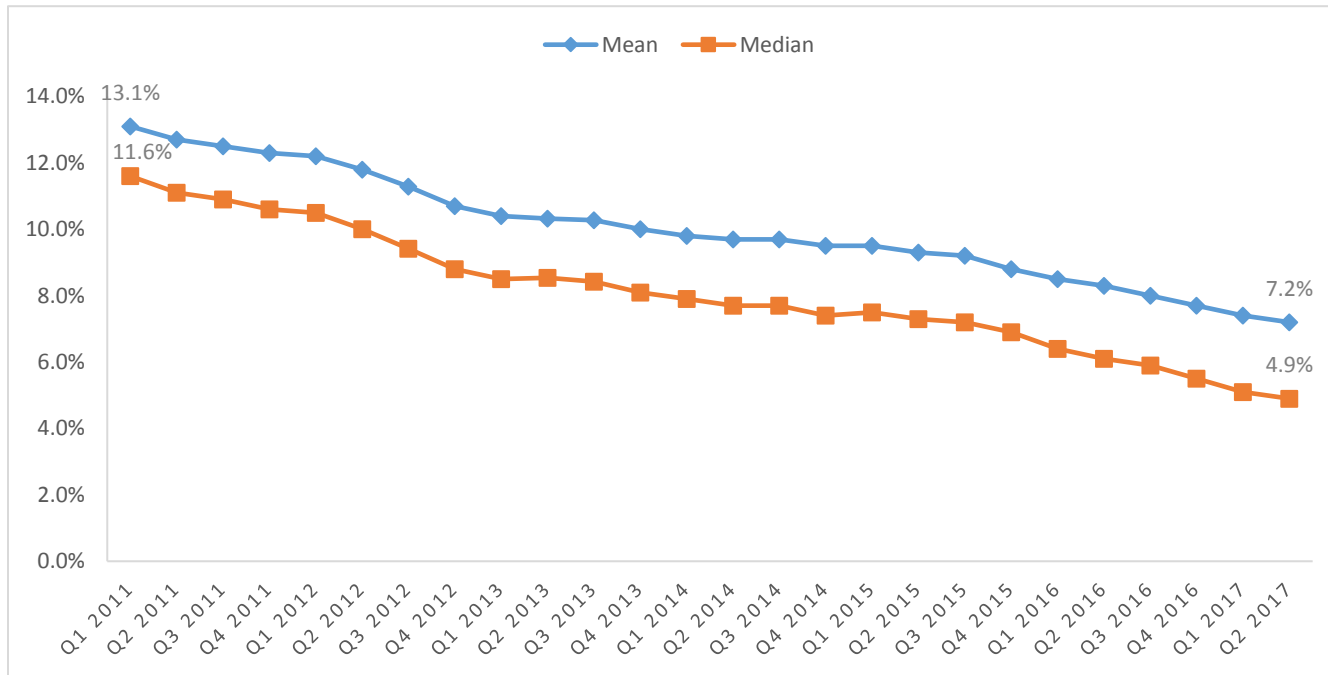
<i>k</i>	Mean score	Std dev.	10th percentile	20th percentile	30th percentile	40th percentile	50th percentile	60 th percentile	70th percentile	80th percentile	90th percentile	% of facilities with “perfect scores”	Interquartile range
13,691	7.2%	7.6%	0.0%	0.0%	2.0%	3.3%	4.9%	6.9%	9.4%	12.6%	17.8%	22.7%	9.6%

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 (ac356_request_q2627_677.log; ac362_request_q2627_677.log)

Figure A1
Mean and Median Facility-Level Scores by Quarter for #0677 Percent of Residents Who Self-Report Moderate to Severe Pain (Long 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 #0677 Percent of Residents Who Self-Report Moderate to Severe Pain
(Long Stay) by Racial Identification

Race	<i>n</i>	Mean	SD	<i>F</i>
Asian	20,785	3.8%	19.2%	624.3*
Hispanic	44,206	3.7%	18.9%	—
Black	122,443	4.6%	21.0%	—
White	634,858	7.6%	26.4%	—
Missing (no race data)	16,550	5.9%	23.6%	—
Total	838,842	6.8%	25.2%	—

* $p < .0001$

SOURCE: RTI analysis of MDS 3.0 episode file for Quarter 2, 2017 (av13_request_q2627_677.log)

Table A3
Facility-Level Score for #0677 Percent of Residents Who Self-Report Moderate to Severe Pain (Long Stay), Stratified by Median Proportion of Non-White Residents

Facility Characteristic	K	Mean	SD	F
≤ 88.0% White (>12.0% Non-White or missing racial ID data)	6,854	6.2%	7.2%	235.48*
> 88.0% White (≤ 12.0% Non-White or missing racial ID data)	6,837	8.2%	7.9%	—
Total	13,691	7.2%	7.6%	—

* $p < .0001$

SOURCE: RTI analysis of MDS 3.0 episode file for Quarter 2, 2017 (av13_request_q2627_677.log)

Table A4 Percentage of Residents Included in the Numerator of #0677 Percent of Residents Who Self-Report Moderate to Severe Pain (Long 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	5.2%	4.8%	4.9%	4.6%	4.7%	4.7%	4.3%	4.3%	3.9%	3.8%
	SD	22.1%	21.4%	21.6%	20.9%	21.1%	21.1%	20.3%	20.3%	19.5%	19.2%
	N	18,977	19,406	19,593	19,784	19,793	20,052	20,417	20,480	20,488	20,785
Hispanic	Mean	5.7%	5.4%	5.1%	5.0%	4.7%	4.6%	4.3%	4.1%	3.9%	3.7%
	SD	23.1%	22.6%	22.1%	21.9%	21.1%	21.0%	20.3%	19.8%	19.3%	18.9%
	N	41,798	42,472	42,847	43,226	43,164	43,246	43,614	43,882	43,864	44,206
Black	Mean	6.5%	6.4%	6.3%	6.0%	5.8%	5.5%	5.3%	4.9%	4.7%	4.6%
	SD	24.7%	24.4%	24.3%	23.8%	23.3%	22.8%	22.4%	21.7%	21.3%	21.0%
	N	117,612	119,382	120,267	120,959	120,380	121,311	121,902	122,182	122,426	122,443
White	Mean	9.7%	9.7%	9.5%	9.2%	8.9%	8.6%	8.4%	8.0%	7.7%	7.6%
	SD	29.7%	29.6%	29.4%	28.9%	28.4%	28.0%	27.7%	27.1%	26.7%	26.4%
	N	640,345	641,193	645,126	647,386	642,375	641,558	643,610	643,043	635,117	634,858
Missing	Mean	8.4%	8.5%	8.6%	8.2%	8.0%	7.1%	6.7%	6.3%	6.3%	5.9%
	SD	27.7%	27.9%	28.0%	27.4%	27.1%	25.8%	25.0%	24.2%	24.3%	23.6%
	N	18,021	17,557	17,239	17,395	17,212	17,149	16,929	17,162	16,711	16,550
	F	562.4*	621.0*	611.7*	612.9*	594.2*	588.5*	617.2*	614.3*	616.4*	624.3*

* $p < .0001$

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	Peoplefirst 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.

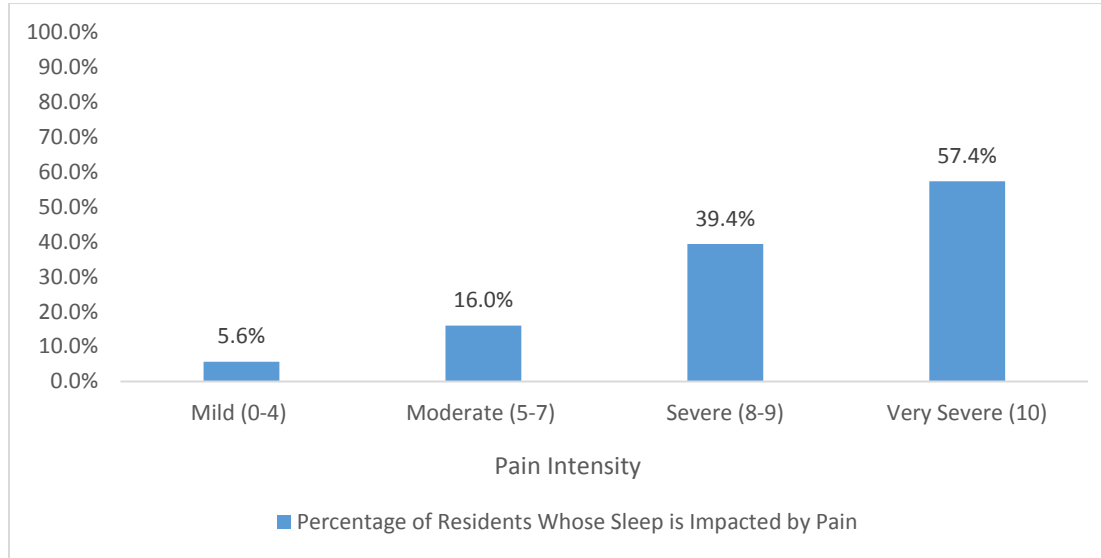
Item-Level Analyses

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 **C2** 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).

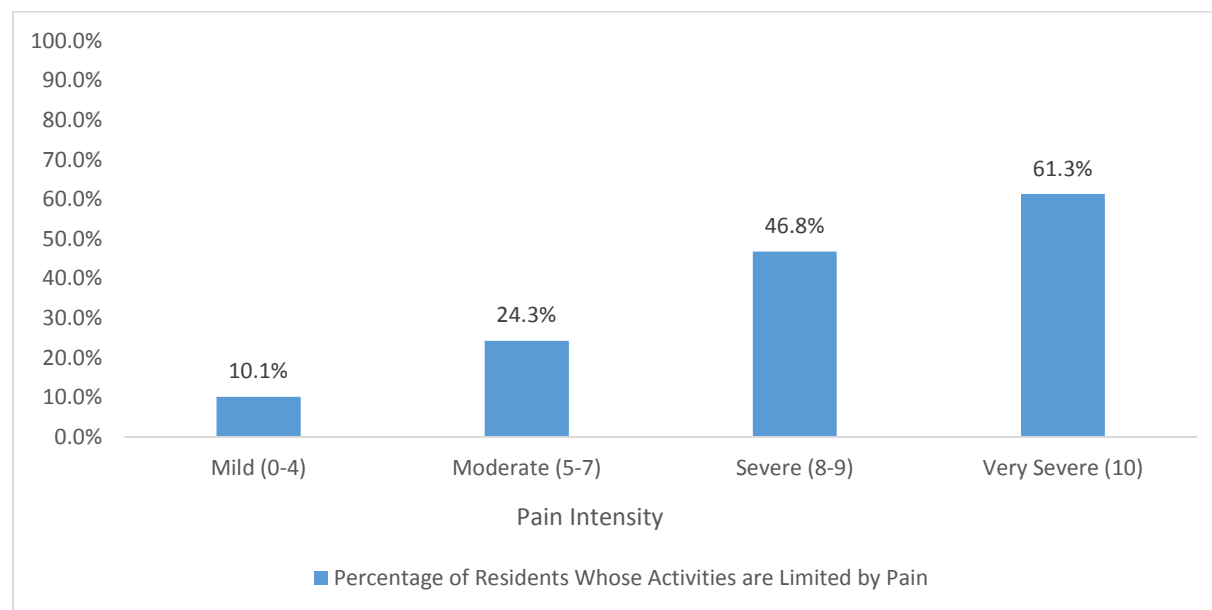
Figure C1. Percentage of Residents Whose Pain Impacts Resident Ability to Sleep at Night by Pain Intensity (Short-Stay)



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.

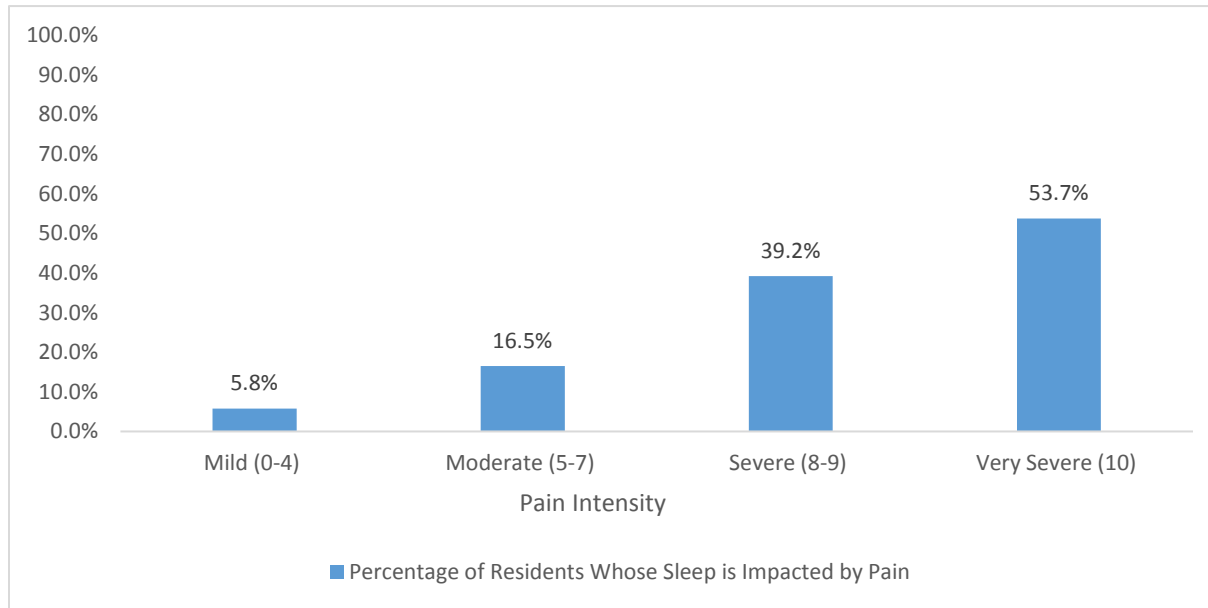
SOURCE: RTI analysis of MDS 3.0 data for Quarter 2, 2017 (programming reference: av15_request_q_26_27.log)

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 **C4** illustrate that as pain severity increased, so did the percentage of residents reporting that their pain impacted their function.

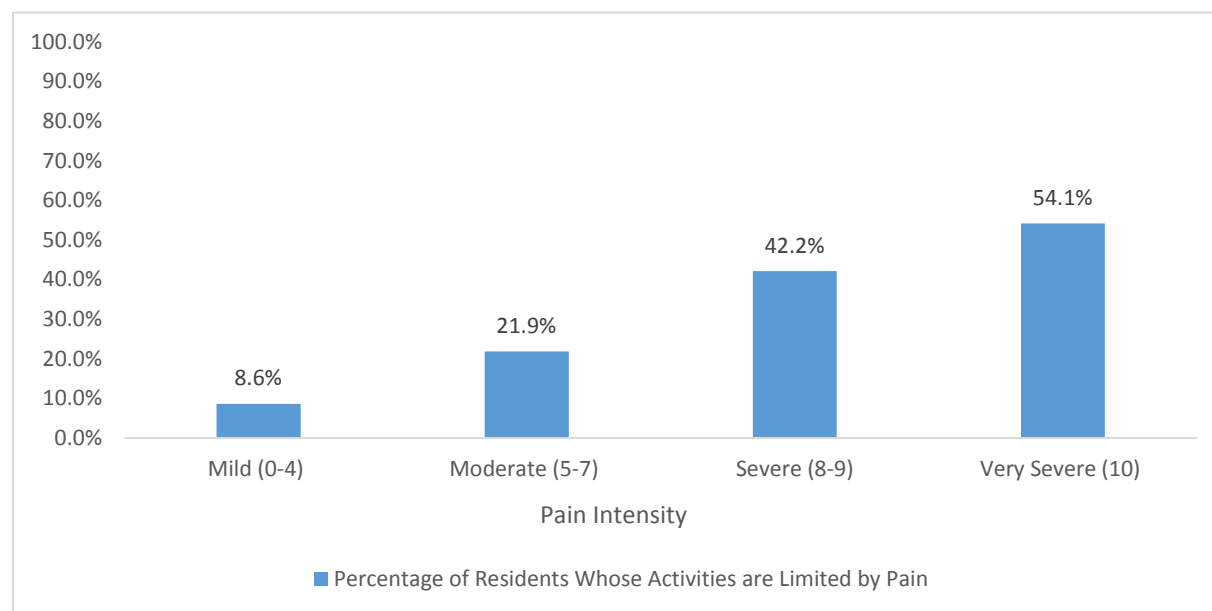
Figure C3. Percentage of Residents Whose Pain Impacts Resident Ability to Sleep at Night by Pain Intensity (Long-Stay)



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)

Measure-Level Analyses

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. ($\chi^2(1) > 79,000, p < .001$). 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 ($\chi^2(1) > 74,000, p < .001$).

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 ($\chi^2(1)$

>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 ($\chi^2(1) > 26,000$, $p < .001$).

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 <input type="checkbox"/>	Ask resident: <i>"Have you had pain or hurting at any time in the last 5 days?"</i> 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 <input type="checkbox"/>	Ask resident: <i>"How much of the time have you experienced pain or hurting over the last 5 days?"</i> 1. Almost constantly 2. Frequently 3. Occasionally 4. Rarely 9. Unable to answer
J0500. Pain Effect on Function	
Enter Code <input type="checkbox"/>	A. Ask resident: <i>"Over the past 5 days, has pain made it hard for you to sleep at night?"</i> 0. No 1. Yes 9. Unable to answer
Enter Code <input type="checkbox"/>	B. Ask resident: <i>"Over the past 5 days, have you limited your day-to-day activities because of pain?"</i> 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 <input type="text"/>	A. Numeric Rating Scale (00-10) Ask resident: <i>"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."</i> (Show resident 00 -10 pain scale) Enter two-digit response. Enter 99 if unable to answer.
Enter Code <input type="checkbox"/>	B. Verbal Descriptor Scale Ask resident: <i>"Please rate the intensity of your worst pain over the last 5 days."</i> (Show resident verbal scale) 1. Mild 2. Moderate 3. Severe 4. Very severe, horrible 9. Unable to answer