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Functional Impairment and the Need for Long-term Care In California Prisons

Analysis Brief

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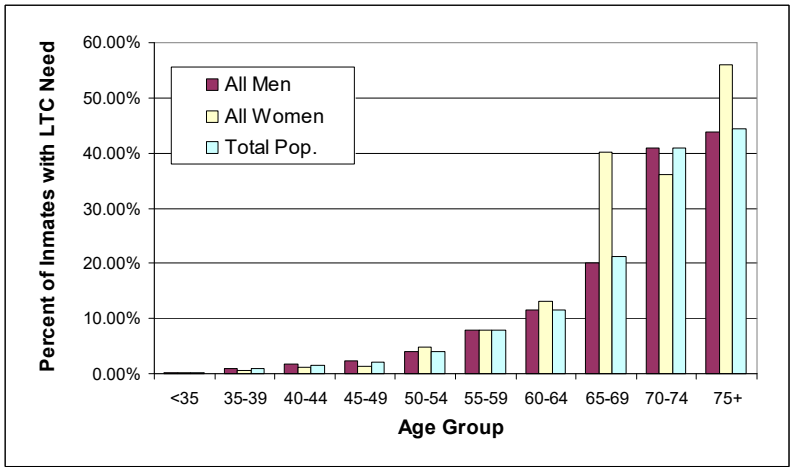
Introduction

A 2006 study of older inmates in California prisons[1] and the subsequent 2007 Chronic and Long-Term Care Needs Assessment (LTC Study) found that California Department of Corrections and Rehabilitation (CDCR) inmates experienced a greater burden of chronic disease and functional limitations than did individuals of the same age living in the community. The LTC Study conducted a long-term care needs assessment for every inmate housed in medical beds (724 inmates) and for a sample of 1192 inmates in the general prison population. Based on these data and prison population projections calculated by the CDCR, the LTC Study provided 10-year projections of the number of California state prison inmates needing long-term care for chronic disease and functional impairment[2]. The study estimated that nearly 3000 California prison inmates needed long-term care in 2007. The probability of needing long-term care was closely associated with age. The study found that 10 percent of inmates age 60 to 64, 20 percent of inmates 65 to 69, and 40 percent of inmates 70 to 74 needed long-term care (Figure 1). If the prison population follows the trends predicted by CDCR, then the number of inmates in need of long-term care will grow steadily to about 5000 inmates by 2017, principally due to growth in the number of older (55+) inmates with long sentences aging behind bars.

Figure 1. Long-term Care Need by Age and Sex in General Population of Nine Sampled Prisons



To accommodate inmates with long-term care needs within the California prison system, the Receivership envisions three levels of long-term care housing and programming that correspond approximately to community-based skilled nursing facilities, assisted living, and congregate living. The LTC Study found that 25 percent of inmates with long-term care needs would be housed in long-term care housing at a level comparable to a skilled nursing facility or assisted living environment. The more mild needs of 75 percent of inmates with long-term care need could be addressed in a specialized generalized population setting where the care would be comparable to that available in a community-based congregate living setting.

In this Analysis Brief, we describe disability-related conditions among inmates needing long-term care. Information on the extent of functional impairment among inmates needing long-term care will help the Receiver design facilities and programming.

Methodology

Sample

On March 14, 2007, we assessed the long-term care needs of 724 inmates in medical beds in all 33 California prisons. The medical bed survey measured functional status, medical conditions, and nursing needs; it included a clinician's assignment of the assessed inmate to a level of care and the clinician's estimate of whether that level of care would be needed long-term (i.e. for 3 or more months). The general population survey gathered the same data elements (except the clinician assignment) for a sample 1192 general population inmates from 9 prison facilities[1]. We purposefully selected prisons because resources precluded traveling across the state to visit a random sample of prisons.

The need for long-term care is rare in the general prison population, so a simple random sample of inmates of just over 1000 inmates would have been uninformative. Instead, we designed our sampling strategy for general population to allow efficient estimation of long-term care need. We partitioned general population inmates into four strata. Two data sources informed the sample stratification: (1) data on age, physical impairment, and prior healthcare utilization available for all inmates from existing CDCR databases; and (2) correctional officer (CO) identification of inmates who they felt should be housed outside the general population in a special housing unit because of medical, functional, or cognitive problems.

Using the assessments of inmates in medical beds[2], we developed a statistical model for predicting long-term care risk based on age, physical impairment, and prior healthcare utilization. Based on this estimated long-term care risk and the correctional officer nominations, we stratified the population of the nine selected prisons as follows: (1) high-risk and CO-nominated (n=288); (2) low-risk and CO-nominated (n=360); (3) high-risk and not nominated (n=2690); and (4) low-risk and not nominated (n=42,185). Because the probability of needing long-term care was expected to be near zero for inmates who were low-risk and not nominated, we did not sample any inmates from the fourth stratum.

Assessment Data

A consultant team led by Abt Associates, in collaboration with CDCR and CPR clinicians, developed the Care Management Screening and Assessment Tools for the medical bed census and the general population survey to collect data that would provide a "snapshot" of the health and functional status of inmates. The six-page form contained sections on demographics and custody information, disease burden, medical-nursing needs and treatments, and physical functioning.

CDCR consultant nurses conducted the medical bed census with technical assistance from Abt Associates. After completing training on the data collection protocol, these nurse-assessors obtained

[1] Nine sampled facilities were ASP, CCI, CCWF, CEN, CMF, HDSP, SATF, SVSP, SOL

[2] Two of the 724 medical bed census inmates were dropped from the analyses presented in this memo because of incomplete data.

data from inmate medical charts and from nurses providing care to inmates who served as proxy respondents.

Consultant clinicians from the consulting firm Lumetra assessed the health and functional status of general population inmates following a protocol similar to the one used for the medical bed census, with modifications to account the use of correctional officers (instead of nurses) as proxy respondents for inmates. The medical chart abstraction provided information on disease diagnoses and nursing needs. Correctional officers provided information on the inmates current physical and cognitive functioning.

Nursing care needs

The assessment included a tally of 54 categories of "nursing needs." Five of these categories involved assistive technologies closely associated with physical disabilities affecting mobility: straight cane, quad cane, walker, wheelchair, mechanical lift. In addition inmates who were blind in two eyes or deaf in both ears were identified as having nursing needs associated with those functional limitations. For inmates in medical beds, information on nursing needs was gathered both from medical records and from direct questioning of clinical staff caring for the inmates. For the inmates in general population sample, nursing needs were determined primarily from the medical record since the clinical staff was not available to report on the patients care needs.

Assessment of Physical Function

In addition to the information on nursing care needs related to mobility, vision, and hearing, physical function was measured in six standard activities of daily living (ADLs) and six prison activities of daily living (PADLs) using validated methodologies [3,4,5]. Inmate's ability to perform six ADLs (i.e., walking, dressing, eating, toilet use, personal hygiene, bathing/showering) was measured on a three-point scale that captures the level of support required in the previous week (independent, supervision or limited assistance, extensive assistance or total dependence, or activity did not occur). Since ADLs generally are undertaken daily by healthy, unimpaired individuals, we assumed that if any of the ADLs did not occur, the inmate was not able to perform that ADL without extensive assistance.

Physical Function: ADLs
1 Walking
2 Dressing
3 Eating
4 Toilet use
5 Personal hygiene
6 Bathing or showering
Physical Function: PADLs
1 Getting on the floor for alarms
2 Hearing orders from staff
3 Standing for head count
4 Going to the dining hall
5 Getting up on a top bunk
6 Climbing one flight of stairs
Cognitive Function
1 Decision-making
2 Short-term memory
3 Long-term memory
4 Making oneself understood

Limitations in physical function raise particular challenges for those living in prison. "Prison Activities of Daily Living" (PADLs) captured six key functional abilities specific to life in a correctional facility that may drive placement of inmates: the ability to (1) get on the floor for alarms, (2) hear orders from staff, (3) stand for head count, (4) go to the dining hall, (5) get up on a top bunk, and (6) climb one flight of stairs. Inmate's ability to perform each of the six PADLs was measured on a three-point scale (can perform the activity, temporarily cannot do activity, permanently cannot do activity).

Assessment of Cognitive Function

Cognitive function was measured using four items: decision making,

short-term memory, long-term memory, and ability to make oneself understood. Decision making was measured on a four-point scale from independent to severely impaired. Both memory questions had a dichotomous response set indicating the presence or absence of memory problems. Difficulty making oneself understood was measured on a four-point scale from always understood to rarely understood.

Estimation of the Needed Level of Long-term Care

Care management screening of medical bed inmates by CDCR nurse-assessors included the clinician's assignment of the inmate to a level of care (high acuity, low acuity, specialized general population (SGP), general population, or hospice) and expected duration for which care at that level would be required (less than 3 months, more than 3 months). Long-term care was defined to be care requiring a high acuity, low acuity or specialized general population bed for at least 3 months.

Rather than having the clinician-assessor determine the level of long-term-care needed by inmates in the general population, we used statistical analysis to estimate the probabilities of needing long-term care at each of the three levels (SGP, low acuity, and high acuity). With input from three clinicians specializing in long-term care, the assignment algorithm was developed using data from the assessment of the medical bed inmates. Details of the assessment protocol are found in the original LTC Study report[2]. In brief, we used a two-step approach that first screened inmates for any functional limitation (serious limitation in ADL, permanent limitation in PADL, or any cognitive problem) and then estimated the probability of long-term care need using a multivariate model based on age, functional limitation, nursing needs, and disease diagnoses.

Identifying Functional Impairment with Standardized Assessment Items

An inmate was considered significantly impaired if he or she met any of the following six criteria measured using standard long-term care assessment items derived from the Minimum Data Set (MDS):

1. Requires extensive assistance or totally dependent on assistance to perform at least one ADL
2. Permanent inability to perform at least one PADL
3. Problem with decision-making
4. Problem with short-term memory
5. Problem with long-term memory
6. Difficulty making oneself understood

We did not include the information on nursing care needs related to mobility, vision, and hearing in the definition of impairment, because there was a concern that some prisoners who had procured assistive devices did not actually have significant limitation in physical function or had only a short-term limitation buts that would resolve within three months. Furthermore, because data on mobility-related nursing needs for general population inmates were obtained from the medical chart, these data were not considered to be as current as the ADL and PADL assessment. Finally, it was believed that most persons currently needing assistive devices or who were blind or deaf would have observable limitations in ADLs in PADLs that would be captured in the ADL and PADL assessments.

Population-level estimates of Impairment and Functional Limitations among long-term care inmates

Clinicians, having completed an inmate's assessment, assigned the inmate to a level of long-term care and indicated whether that level of care was expected to be needed for 3 months or more. These assignments by clinician-assessors were taken as a gold standard and were available for the complete census of medical bed inmates, so no statistical manipulations were necessary to generalize to all inmates in medical beds. Likewise, estimation of impairment among medical bed inmates needing long-term care at each level of care was straightforward.

For inmates in general population, population-level estimates were based on the general population sample. We used the survey data to estimate the probability of LTC need and functional limitations for every member of the sample. We weighted those sample-based estimates by the inverse of the sampling probabilities to generate estimates for the full CDCR general population. In doing so, we assumed the average prevalence of long-term care need in the 24 unsampled prisons stratified by high- and low- risk is the same as the average for similarly stratified inmates in the sampled prisons (excluding CMF because of its unique medical mission).

Sample Calculation.
Assume a hypothetical inmate has 1 ADL and he has an estimated probability of needing long-term care in SGP equal to 0.3 and he has a sampling weight = (1 / Pr[selection]) = 2.5, then he represent 0.75 inmates needing SGP in the full CDCR general population. Another inmate with no ADLs and an estimated probability of needing long-term care in SGP = 0.1 and a sampling weight of 1.5 represent 0.15 inmates needing SGP. If these were the only two inmates in the sample, then the estimated probability of having an ADL *given a need for long-term care in SGP* is 0.75 / (0.75 + 0.15) = 0.833.

Results

Medical Bed Census

Sample

All 724 inmates in CDCR medical beds on March 14, 2007 were assessed. Three hundred thirty inmates were assigned to long-term care by clinician assessors. An additional 37 inmates were assigned to a higher level of care but clinician assessors did not indicate the duration of care required. In the original LTC Study, inmates for whom clinician assessors did not indicate the expected duration of care were assumed to need long-term care. For the current study, we examined each of these cases in order to refine the precision of our estimate of long-term care need and level of care. Thus, for this analysis, 341 inmates in medical beds were estimated to need long-term care.

Impairment

Of the 341, 293 (86 percent) reported significant limitation in ADLs, PADLs, or cognitive function (Group A in Table 1). Inmates assigned to higher levels of care were found to be more functionally impaired; 80 percent of SGP, 88 percent of low acuity, and 96 percent of high acuity inmates in medical beds were found to be impaired. We examined the full assessment record for each of the 48 inmates who needed long-term care but apparently lacked any serious ADL, permanent PADL, or cognitive problem. We found evidence of functional limitation for 33 of these inmates (Group B in Table 1). Seven inmates had a medical condition such as hepatic encephalopathy that indicated probable cognitive impairment. Twenty-five had conditions that indicated impairment in physical function (e.g. paraplegia, frequent

falls, need for limited assistance with several ADLs, blindness, chronic pain), often combined with several daily nursing treatment needs such as intravenous medication administration or oxygen supplementation (e.g. CPAP).

Combining all medical bed inmates with evidence of long-term functional impairment, we estimate that 96% of medical bed inmates needing long-term care were functionally impaired. Fifteen inmates, for whom there was no evidence of functional limitations in the assessment data, nevertheless had a complex set of comorbidities that was judged by clinician-assessors to necessitate long-term care outside of the general population (Group C in Table 1). For example, one female inmate suffered from end-stage renal disease for which she was receiving dialysis, and also had congestive heart failure, hypertension, and systemic lupus erythematosus. While this inmate reported no serious limitations in ADLs or PADLs, clinician-assessors felt her case would be better managed if she were housed in a specialized general population unit designed for efficient delivery of long-term care services.

Table 1. Impairment among medical bed inmates[1]

Impairment Status if Medical Bed Inmates	Number of Inmates (Percent[2])			
	Special GP[3] Inmates (Pct) n=168	**Low Acuity** Inmates (Pct) n=88	**High Acuity** Inmates (Pct) n=85	**All LTC Beds** Inmates (Pct) n=341
A. Serious limitation in ADL, permanent limitation in PADL, and/or any limitation in cognitive function	134 (80)	77 (88)	82 (96)	**293 (86)**
B. Reported medical conditions implies long-term functional limitation	26(15)	5 (6)	2 (2)	**33 (10)**
Total Inmates with Impairment (A+B)	158 (95)	82 (93)	84 (99)	**324 (96)**
C. Inmates with no reported functional limitation indicating impairment, but with a complex combination of medical conditions necessitating assignment to LTC bed	8 (5)	6 (7)	1 (1)	**15 (4)**

Physical Function Limitations

Of the inmates in medical beds across all California prisons, 45 percent had some functional limitation in ADLs (LTC Study[2]). An ADL limitation severe enough to require extensive assistance or render the inmate totally dependent on others was found in 26 percent of inmates (LTC Study[2]). Among the 341 inmates determined to need long-term care, 127 (37 percent) had a serious limitation in at least 1 ADL (Table 2). The number of ADLs in which an inmate required at least extensive assistance was strongly associated with level of care. Inmates needing specialized general population were unlikely to have any ADL limitation (mean 0.33). In contrast, low acuity and high acuity long-term care inmates, on average, experienced 1.1 and 3.3 ADL limitations, respectively.

Inmates in medical beds had more limitations in PADLs than in ADLs. Among inmates needing long-term care, 261 (77 percent) had a permanent limitation in at least 1 PADL. PADL limitations were seen in most

long-term care inmates regardless of their level of care. However, inmates needing high acuity long-term care tended to have more permanent PADL limitations.

Cognitive Function Limitations

Of the long-term care inmates in medical beds, 142 (42 percent) had at least one of the following: impaired decision making ability, a problem with short or long-term memory, difficulty making oneself understood (Table 4). There was a significant overlap between cognitive and physical impairment. Eighty-seven percent of those needing long-term care who had a limitation in cognitive function also had limitation in physical function (either in an ADL or PADL). As with physical limitations, we observed a trend in which higher acuity long-term care inmates reported more cognitive problems. Among inmates in medical beds, those assigned to high-acuity long-term care reported 1.7 cognitive problems on average compared to 0.47 among those assigned to specialized general population.

Table 2. Impairment and functional limitations among inmates in medical beds needing long-term care

Condition	Assessed Level of Long-Term Care Need (bed type)			
	Specialized GP[1] Inmates (Pct[2])	**Low Acuity** Inmates (Pct)	**High Acuity** Inmates (Pct)	**All LTC Beds** Inmates (Pct)
Needing Long-term Care	168 (100)	88 (100)	85 (100)	341 (100)
Number of ADL limitations[3]				
0	138 (82)	52 (59)	24 (28)	**214 (63)**
1	22 (13)	16 (18)	3 (4)	**41 (12)**
2	1 (1)	5 (6)	8 (9)	**14 (4)**
3	1 (1)	2 (2)	4 (5)	**7 (2)**
4	1(1)	2(2)	8 (9)	**11 (3)**
5	4 (2)	5 (6)	14 (16)	**23 (7)**
6	1 (1)	6 (7)	24 (28)	**31 (9)**
At least 1	30 (18)	36 (41)	61 (72)	**127 (37)**
Mean (SD)	0.34 (1.0)	1.1 (1.9)	3.3 (2.5)	**1.3 (2.1)**
Number of PADL limitations				
0	44 (26)	23 (26)	13 (15)	**80 (23)**
1	18 (11)	7 (8)	1 (1)	**26 (8)**
2	38 (23)	11 (13)	5 (6)	**54 (16)**
3	25 (15)	10 (11)	9 (11)	**44 (13)**
4	28 (17)	18 (20)	7 (8)	**53 (16)**
5	12 (7)	15 (17)	36 (42)	**63 (18)**
6	3 (2)	4 (5)	14 (16)	**21 (6)**
At least 1	124 (74)	65 (74)	72 (85)	**261 (77)**
Mean (SD)	2.1 (1.7)	2.6 (2.0)	3.8 (2.0)	**2.7 (2.0)**
Cognitive Impairments[4]				
Decision Making	31 (18)	40 (45)	49 (58)	**120 (35)**
Short-term Memory	8 (5)	26 (30)	32 (38)	**66 (19)**
Long-term Memory	22 (13)	24 (27)	22 (26)	**68 (20)**
Making Self Understood	18 (11)	25 (28)	43 (51)	**86 (25)**
Any Cognitive impairment	44 (26)	45 (51)	53 (62)	**142 (42)**
Mean cognitive problems (SD)	0.47 (.95)	1.3 (1.5)	1.7 (1.6)	**1.0 (1.4)**
ADL, PADL, and/or any cognitive limitation	134 (80)	77 (88)	82 (96)	**293 (86)**
Medical conditions implies long-term functional limitation	26(15)	5 (6)	2 (2)	**33 (10)**
Total with Impairment	158 (95)	82 (93)	84 (99)	**324 (96)**

[1]Special GP = Specialized General Population, [2]Pct = Column Percentage. May not sum to 100 percent due to rounding. [3]Serious limitations are those requiring "extensive assistance" or for which inmate is "total dependent" or where "activity did not occur."
[4]Decision making not fully independent (i.e. at least experiences "difficulty in decision-making when faced with new tasks or situations"), any short- or long-term memory problem, or difficulty making oneself understood (i.e. at least difficulty finding words or finishing thoughts and requiring prompting)

Nursing care needs

Table 3 shows the distribution of nursing care needs related to mobility and sensory limitations for inmates in medical beds. These needs were much more frequent among inmates who were assessed to need long-term care. Among long-term care inmates, 215 (58 percent) had a need for an assistive device (e.g. cane, walker, wheelchair, lift). Walkers and wheelchair were more common among those assigned to specialized general population and low-acuity long-term care beds. Mechanical lifts were needed almost exclusively by patients assigned to high-acuity long-term care beds. However, no clear association between in the need for mobility-related assistive devices generally and level of care was observed. About 60% of inmates at each long-term care acuity level required some type of assistive device. There were also 15 inmates needing long-term care who were blind in both eyes. In addition to these inmates with mobility and sensory related nursing needs, there were some inmates who reported a need of an assistive device or who reported blindness or deafness in the chronic disease inventory section of the assessment. These individuals are not included in Table 3.

Table 3. Nursing needs related to physical function among inmates in medical beds needing long-term care

Condition	Assessed Level of Long-Term Care Need (bed type)			
	Specialized GP[1] Inmates (Pct[2])	**Low Acuity** Inmates (Pct)	**High Acuity** Inmates (Pct)	**All LTC Beds** Inmates (Pct)
Needing Long-term Care	168 (100)	88 (100)	85 (100)	341 (100)
Mobility-related Nursing Needs				
Cane	12 (7)	5 (6)	3 (4)	**20 (6)**
Walker	29 (17)	12 (14)	8 (9)	**49 (14)**
Wheelchair	81 (48)	42 (48)	35 (41)	**158 (46)**
Mechanical Lift	0 (0)	2 (2)	21 (24)	**23 (7)**
Any Mobility-Related Need	108 (64)	53 (60)	54 (64)	**215 (63)**
Sensory-related Nursing Needs				
Blind 2 Eyes	12 (7)	1 (1)	2 (2)	**15 (4)**
Deaf 2 Ears	0 (0)	0 (0)	0 (0)	**0 (0)**
Any Sensory-Related Need	12 (7)	1 (1)	2 (2)	**15 (4)**

[1]Special GP = Specialized General Population, [2]Pct = Column Percentage. May not sum to 100 percent due to rounding.

General Population Sample

Sample

We assessed 1192 inmates from the 3 higher risk strata (which contained a total of 3338 inmates). Of the assessed inmates, 26 were excluded because they were in a medical bed at the time of the medical bed census and thus are already represented by the medical bed census. We used a statistical assignment algorithm (instead of the direct clinician assignment used in the medical bed census) to estimate the probability that each sampled inmate needed long-term care. The algorithm assigned a zero probability of needing long-term care to individuals with no functional limitation, and then used a multivariate model to estimate a probability of needing long-term care at each level of care for all individuals having any functional limitation in ADLs, PADLs, or cognitive limitation.

Of the 1166 general population inmates sampled, we estimated that 678 had a need for long-term care. After accounting for sampling probability, we estimated that 1156 inmates in the 9 sampled prisons need long-term care. We assumed the average prevalence of long-term care need in the 24 unsampled prisons stratified by high- and low- risk is the same as the average for similarly stratified inmates in the sampled prisons (excluding CMF because of its unique medical mission). Accordingly, we estimated that 2608 inmates in the full CDCR population need long-term care: 1991 in SGP beds, 449 in low-acuity beds, and in 168 high-acuity beds. Details of the estimation of long-term care need can be found in the original report of the LTC Study [2].

Impairment among General Population Inmates Needing Long-term Care

We used results from the general population sample to estimate impairment in the full California prison system exclusive of inmates in medical beds. We generalized the findings on functional limitations in the sample to the full general population, adjusting for sampling probability. Because, the assignment algorithm considered functional impairment a prerequisite for long-term care, all 2608 inmates in the full general population estimated to need long-term care were functionally impaired (Table 4).

Among inmates estimated to current have a need for long-term care, general population inmates who were less likely to have ADL limitations and more likely to have PADL limitations than inmates already in medical beds. Twelve percent of the inmates in general population needing long-term care had a serious ADL limitation and 88 percent permanently could not perform at least one PADL, compared to 27 percent (for ADLs) and 77 percent (for PADLs) of medical bed inmates. Cognitive limitation was more frequently observed among the medical bed inmates than general population inmates. Still, 27 percent of the inmates in general population who are estimated to current have a need for long-term care had a cognitive impairment.

As expected, and as observed among those in medical bed census, the mean number of ADL limitations increased with acuity of long-term care need. However, we did not observe similar trends for PADLs or cognitive limitations.

Table 4. Estimated impairment and functional limitations among general population inmates needing long-term care

Condition	Assessed Level of Long-Term Care Need (bed type)			
	Specialized General Population[1] Inmates (Pct[2])	**Low Acuity** Inmates (Pct)	**High Acuity** Inmates (Pct)	**All LTC Beds** Inmates (Pct)
Needing Long-term Care	1991 (100)	449 (100)	168 (100)	2608 (100)
Number of ADL limitations[3]				
0	1765 (88.6)	391 (87.1)	143 (85)	2299 (88.1)
1	147 (7.4)	35 (7.9)	15 (9.2)	198 (7.6)
2	15 (0.8)	4 (0.9)	2 (1.2)	21 (0.8)
3	31 (1.6)	5 (1.2)	2 (0.9)	38 (1.5)
4	10 (0.5)	2 (0.3)	1 (0.5)	12 (0.5)
5	14 (0.7)	11 (2.5)	5 (3.2)	31 (1.2)
6	9 (0.4)	0 (0.1)	0 (0.1)	9 (0.4)
At least 1	226 (11.4)	58 (12.9)	25 (15)	309 (11.9)
Mean	0.22	0.27	0.33	0.23
Number of PADL limitations				
0	233 (11.7)	59 (13.1)	22 (13)	314 (12.1)
1	440 (22.1)	89 (19.8)	31 (18.2)	559 (21.4)
2	540 (27.1)	124 (27.7)	45 (26.9)	710 (27.2)
3	391 (19.6)	88 (19.6)	32 (19.2)	511 (19.6)
4	285 (14.3)	58 (12.9)	19 (11.6)	362 (13.9)
5	71 (3.5)	17 (3.8)	10 (6)	98 (3.8)
6	31 (1.6)	13 (3)	9 (5.3)	54 (2.1)
At least 1	1758 (88.3)	390 (86.9)	146 (87)	2294 (87.9)
Mean	2.20	2.23	2.37	2.21
Cognitive Impairments[4]				
Decision Making	379 (19)	93 (20.7)	32 (18.9)	504 (19.3)
Short-term Memory	208 (10.5)	47 (10.4)	17 (10.1)	272 (10.4)
Long-term Memory	189 (9.5)	41 (9)	15 (8.8)	244 (9.4)
Making Self Understood	315 (15.8)	71 (15.7)	24 (14.2)	410 (15.7)
Any Cognitive impairment	550 (27.6)	131 (29.2)	43 (25.7)	724 (27.8)
Any Functional Impairment	1991 (100)	449 (100)	168 (100)	2608 (100)

[1]Special GP = Specialized General Population, [2]Pct = Column Percentage. May not sum to 100 percent due to rounding. [3]Serious limitations are those requiring "extensive assistance" or for which inmate is "total dependent" or where "activity did not occur." [4]Decision making not fully independent (i.e. at least experiences "difficulty in decision-making when faced with new tasks or situations"), any short- or long-term memory problem, or difficulty making oneself understood (i.e. at least difficulty finding words or finishing thoughts and requiring prompting)

Nursing care needs

Among inmates in general population, many had nursing care needs that implied physical impairment. The six most common needs were all related to physical function: straight cane, chronic pain, wheelchair, blindness, orthotic device, and hearing impaired (See original LTC Study report). Table 5 shows the estimated number of general population inmates with mobility- and sensory-related nursing needs. These needs were more likely among inmates needing higher acuity long-term care. Overall, 57 percent of inmates in general population estimated to need long-term care have a mobility-related nursing need. Approximately one-fifth of individuals with a mobility-related nursing need lacked serious limitation in ADLs or permanent PADLs (not shown in table). However, most of these individuals reported a mix of mild ADL limitations or temporary PADL limitations.

Table 5. Nursing needs related to physical function among inmates in general population needing long-term care

Mobility-related Nursing Needs				
Cane	572 (28.7)	128 (28.5)	45 (27)	745 (28.6)
Walker	164 (8.2)	43 (9.7)	20 (12.2)	228 (8.7)
Wheelchair	624 (31.3)	150 (33.3)	64 (38.1)	838 (32.1)
Any M.R. Nursing Need	1125 (56.5)	260 (57.8)	104 (62.1)	1489 (57.1)
Sensory-related Nursing Needs				
Blind 2 Eyes	388 (19.5)	17 (3.8)	14 (8.5)	419 (16)
Deaf 2 Ears	42 (2.1)	8 (1.8)	5 (2.7)	54 (2.1)

Impairment in the Full CDCR population needing Long-term Care

Table 6 summarizes results for prevalence of impairment and functional limitations in the full CDCR population needing long-term care. Combining the results of the medical bed census and the general population sample, we estimate that 98 percent of all inmates needing long-term care have a significant impairment comprising at least a serious limitation in 1 ADL, a permanent limitation in 1 PADL, or a serious cognitive problem. An additional 1 percent of the inmates estimated to need long-term care did not report serious ADL limitations or permanent PADL limitations or cognitive problems but had medical conditions (e.g. hepatic encephalopathy, paraplegia) that implied serious functional limitation. The remaining 1 percent of long term care inmates did not have evidence of serious functional limitation, but had a complex combination of comorbidities that warranted long-term care to ensure high-quality, efficient disease management.

Of all CDCR inmates estimated to need long-term care, 58 percent have a mobility-related nursing need. Nearly 1000 inmates require a wheelchair, and 765 need either a straight cane or a quad cane. We estimate that about 430 inmates in CDCR population are blind in two eyes. Deafness was much less common, affecting only 54 inmates.

Table 6. Summary of estimates of impairment among all CDCR inmates needing long-term care[1]

	Among those with long-term care need		
Condition	**Medical Bed Inmates** (Percent)	**General Population Inmates** (Percent)	**Inmates in Full CDCR Population** [2] (Percent)
	n =341	n =2608	n =2956
Impairment			
At least 1 ADL impairment[3]	127 (37)	309 (12)	436 (15)
At least 1 permanent PADL impairment	261 (77)	2294 (88)	2555 (86)
At least 1 cognitive impairment	142 (42)	724 (28)	866 (29)
Medical conditions imply long-term impairment[4]	33 (10)	n/a	33 (1)
At least 1 impairment of any kind[5]	304 (87)	2608 (100)	2912 (99)
Mobility-related Nursing Needs			
Straight or Quad Cane	20 (6)	745 (29)	765 (26)
Walker	49 (14)	228 (9)	277 (9)
Wheelchair	158 (46)	838 (32)	996 (34)
Mechanical Lift	23 (7)	0 (0)	23 (1)
Any mobility-related nursing need	215 (63)	1489 (57)	1704 (58)
Sensory Limitation Nursing Needs			
Blind in 2 eyes	15 (4)	419 (16)	434 (15)
Deaf in 2 ears	0 (0)	54 (2)	54 (2)

[1]Estimates are for 2007. [2]Does not include ~28,000 inmates in reception centers or ~7500 in community corrections. [3]ADL impairment requiring "extensive supervision" or for which inmate is "totally dependent". [4]These are cases that had no major ADL or permanent PADL or cognitive limitation but had a medical condition that indicated functional impairment (see text). [5]Impaired inmates were those that needed extensive assistance or were totally dependent in at least one ADL **or** had a permanent inability to perform at least one PADL **or** had a cognitive impairment or who had medical conditions implying long-term functional limitation.

Discussion

In the medical bed census we observed a very close relationship between impairment and long-term care need. Nearly every inmate assessed to have long-term care need was also found to have significant physical or cognitive limitations. We estimated that 99% of the target population for the new long-term care medical beds which the Receiver is planning to construct have significant functional impairment.

A small fraction of inmates (n=15) in medical beds that were determined to need long-term care did not have any major functional impairment identified by the assessment. However, these inmates had a complex combination of medical conditions that warranted long-term care. These inmates may experience modest levels of impairment not detected with our survey instrument.

Our study did not have the statistical power to detect an association between the number and severity of functional limitations and assessed level of long-term care need. However, the observed trends in the data suggest inmates needing higher level of care tend to have more functional limitation. This trend was strongest for ADLs, but also observed for PADLs.

For this analysis, we defined significant impairment as having at least a need for "extensive assistance" in at least one ADL or having a permanent limitation in at least one PADL or as having any of four problems with cognitive function. Had a more restrictive (or inclusive) definition been adopted, the estimated prevalence of impairment would have been lower (or higher). For example, among medical bed inmates it was observed that some individuals with long-term care need had ADL limitations that require more mild levels of assistance that did not meet our criteria for impairment. Conversely, 78 individuals in the general population estimated to need long-term care had no ADL or PADL limitations, and only modest cognitive limitations in decision-making or making themselves understood.

The survey instrument used to collect the needs assessment data was designed for the purpose of generating population-level estimates of long-term care need using proxy respondents and statistical methods. Specifically, each sampled general population inmate that was assessed to be impaired was assigned a *probability* of needing long-term care based on their characteristics. This approach efficiently produced valid population-based estimates of long-term care need. However, in predicting impairment and long-term care need for *individual* inmates, the method is not likely to be as precise as direct clinician assessment of inmates.

Estimates of impairment in the CDCR prison population are based on proxy assessment of ADLs, PADLs, and four items measuring cognitive function. Therefore, the margin of error in the estimates may be greater than if comprehensive diagnostic assessments involving direct interaction with inmates had been undertaken. In particular, the measure of cognitive function was limited. Proxy assessment of cognitive function is expected to underestimate cognitive problems because many decision-making and memory problems may be difficult for proxies to observe. Measurement error associated with a reliance on proxy respondents may explain the small subset of long-term care inmates whose medical conditions

strongly implied functional impairment but who did not report serious ADL limitations, permanent PADL limitations, or cognitive problems.

Presumably, when long-term care beds become available within CDCR prisons, decisions about long-term care placement at the individual inmate level will rely on clinical expertise aided, perhaps, by needs assessment instruments and tools design for that purpose. At an individual level, placement decisions may not match the results predicted by the model employed in this analysis. For example, this analysis assumed that no person in general population who did not have a functional impairment would need long-term care. However, data from the medical bed census suggests that there may be a small fraction of inmates who, despite not meeting the threshold level of functional impairment, still require long-term care because of a complex combination of diseases or conditions that require frequent medical attention. Clinicians making placement decisions will be able to detect these special cases with a precision that cannot be matched by a survey instrument and statistical algorithm. We assumed these special cases of long-term care need without serious functional impairment would be very rare in the general population since they are characterized by a complex combination of medical conditions that would likely have triggered placement in a medical bed. However, if these special cases do exist in the general population in the same proportion as observed in the medical bed census, our estimates of overall long-term care need may be biased downward by about 4 percent.

Despite their limitations, data on physical and cognitive function collected in the LTC Study provide a basis for estimating impairment among all CDCR inmates. The findings show that nearly 5000 inmates currently have significant cognitive of physical limitations, representing about 3.5 percent of the total inmate population (excluding reception centers and community corrections). The original LTC Study found that the number of inmates needing long-term care was expected to grow nearly 80 percent by 2017, largely due to the aging of the inmate population. Undoubtedly, a comparable growth in the prevalence of impairment can be expected as the inmate population ages over the next decade.

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