



Estimating the Cost of Caring for Children with Complex Medical Conditions During a Nursing Shortage

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Summary

This analysis presents an estimate of hospital costs to Medi-Cal due to increased hospital stays for children with complex health conditions when the parents of these children are faced with shortages of nurses to provide in-home care. It uses data from a survey of hospital use by similar children in Minnesota that measured delays in discharge due to lack of in-home nursing resources. The study dates from 2016 and includes children with diverse payment sources. It appears to be a time without a significant nurse shortage, one like the situation in California in 2019 when the Medi-Cal rate for in-home nursing was very competitive. The Minnesota study provides a baseline set of parameters describing hospital use by children with complex health conditions that can be adjusted to reflect the effects of a nursing shortage that has developed in California since 2019. The model shows that current spending levels for home care nursing for children with complex conditions reflect an over 3-fold (300 percent) increase in delayed discharges and hospital readmissions. If current reimbursement rates for in-home care were increased to levels that prevailed in 2020, thereby easing the shortage conditions, the model, as shown in the table below, predicts that the resulting hospital cost savings of \$490 million would be significantly larger than the estimated \$314 million increase in the cost of the nursing care that results from the rate increase and the associated increase in use.

	With Current Shortage Conditions at Current Medi-Cal Rates	Without Shortage Due to 40% Medi-Cal Rate Increase	Net Cost/(Savings)
Total Hospital Cost	\$938 million	\$448 million	(\$490 million)
In-Home Nursing Cost	\$362 million	\$677 million	\$314 million
Total Cost	\$1,300 million	\$1,125 million	(\$175 million)

¹ This is a revision of a similar analysis prepared in March 2023. This estimate is based on different assumptions regarding the average number of hours in home nursing care are provided during periods of surplus and periods of shortage.

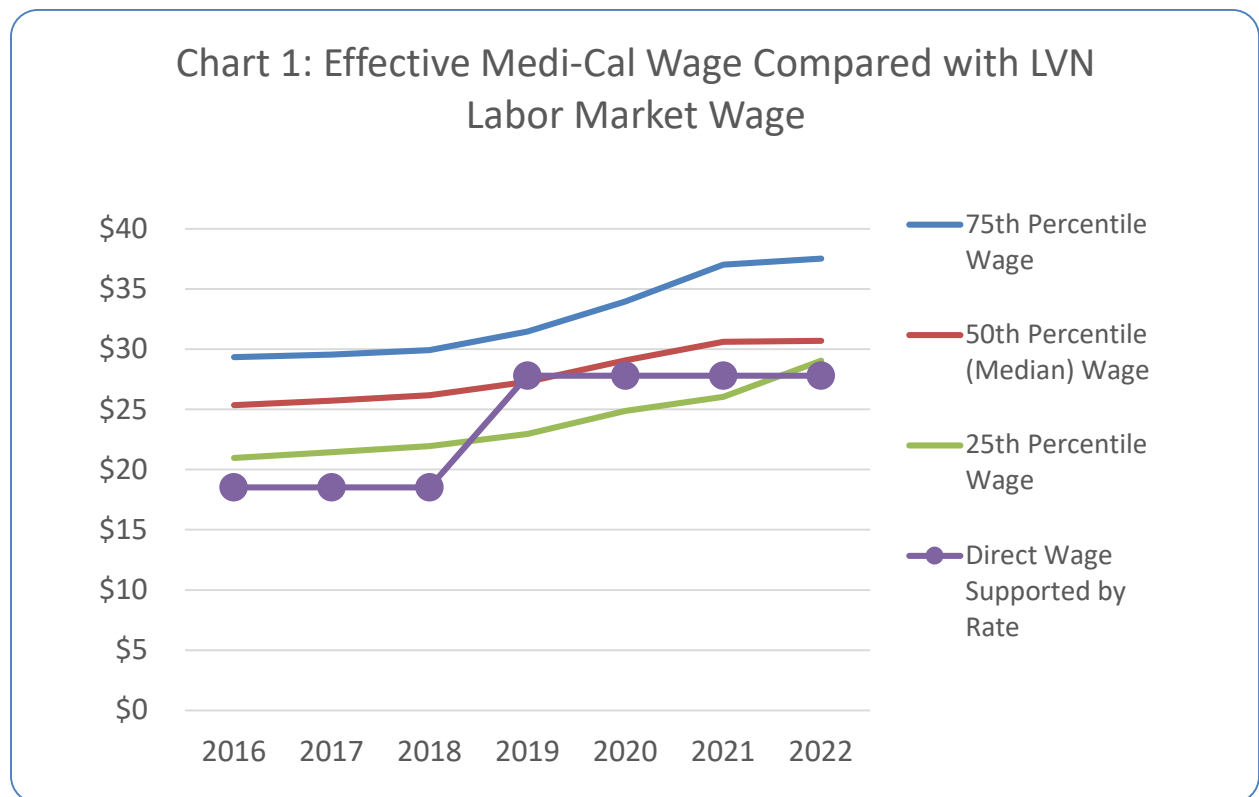
Analysis

The cost effectiveness of home care for children with complex medical conditions has been well established. It is the basis for a variety of home and community-based waivers in the Medicaid program as well as the underlying justification for disregarding the income and assets of the parents of children who are cared for at home. The current shortage of nursing personnel and the related rise in wages paid to nurses present a challenge to the viability of care at home. Median wages measured in first quarter surveys by the Employment Development Department show a 17 percent increase between 2018 and 2022 for California as a whole, but several local labor markets showed markedly higher wage growth, including Los Angeles at 27 percent and the East Bay at 30 percent.ⁱ

The nursing shortage has a particularly strong impact on home care for children with complex medical conditions whose parents are doing their best to care for their children at home. The shortages of nursing personnel can affect the time that a child spends in a hospital when a family is initiating home care. Overall national data show that about 13 percent of children with complex conditions are hospitalized each year.ⁱⁱ Based on data from Minnesota we can expect about 30 percent of these are in their initial hospital stay prior to being discharged to home care.ⁱⁱⁱ For these children, a shortage of nurses means longer hospital stays because of difficulties securing appropriate home care.

More significantly a shortage of home nursing personnel threatens the viability of the home care situation for the other 87 percent of these children. As parents are less able to find staff to fill the authorized hours, they must take on themselves more and more of the nursing care responsibilities. At some point the demands can be too great, and the child may be readmitted because the parents need a respite, because the nursing hours available fall below the minimum the parents require to safely care for their child, or because the lack of nursing care causes a deterioration in the health of the child.

The cause of the nursing shortage in Medi-Cal lies with the low effective wage rate that the Medi-Cal reimbursement can sustain. Licensed vocational nurses provide more than 90 percent of in-home nursing services for children with complex care needs, and registered nurses provide about 5 percent. The following chart shows the labor market wage rates for LVNs since 2016 compared with the effective Medi-Cal wage rate. The effective wage is



arrived at by assuming that the 63 percent of the Medi-Cal rate is actually paid to the professional, while the remaining 37 percent is used to pay the costs of employer tax responsibilities, administrative activities, and supervision. Prior to 2019 the effective wage for LVNs sustained by the Medi-Cal rate hovered between the 25th and 10th percentile of market rates. With the availability of funds from Proposition 56, revenue from that tobacco tax supported a 50 percent increase in rates that put Medi-Cal effective wages just above the 50th percentile of market wage rates. Since then, increased wage rates in the market for LVNs has reduced the competitiveness of Medi-Cal’s rate to the level that it was prior to the 2018 rate increase. This lack of competitiveness means more children staying in the hospital when they could be at home. (It should be noted that RN Medi-Cal rates are even less competitive than LVN rates.)

There is strong evidence that the reimbursement rate for nursing care does correlate with its use. Between 2019 and 2022 the competitiveness of Medi-Cal’s payment rate for LVN service fell dramatically – from a level in excess of the median wage down to a level that was less than the 25th percentile of the market wage, a level that was comparable to the Medi-Cal rate’s position prior to 2019. And this decline in competitiveness is reflected in the number of hours of care reimbursed for in-home LVN care shown in the following table.

Table 1: Hours of LVN Care Reimbursed under Medi-Cal Code G0300^{iv}

	2019	2020	2021	2022 (est.)
Hours of care claimed	5,145,691	6,195,047	5,501,808	4,671,105

Estimating the Cost of the Nurse Shortage

The challenge here is to determine what kind of response one would expect to a Medi-Cal rate increase intended to alleviate nurse shortages and thereby increase reliance on in-home care and reduce hospital use.

It is possible to construct a financial model of costs for children with complex medical conditions using the data from Minnesota that tracked a group of these children noting their hospital use, the extent to which their discharges were delayed due to lack of nurses, and their rates of readmission. These data were reported separately for children newly diagnosed with a serious condition as well as children who had already been under treatment and in home care settings. The data from Minnesota from 2016 included children with a variety of sources of health insurance coverage – including 50 percent with private insurance. The share on Medicaid was not reported.

It is assumed that the data from Minnesota reflect a situation where reimbursement rates were better matched to labor market conditions, a situation comparable to conditions in California in 2019 after the 50 percent rate increase approved in 2018. Based on this assumption, the model can use the Minnesota parameters to be scaled to match the population in California in a way that will yield in-home service spending that matches the level in 2020. Then we can adjust that model to simulate what happened between 2020 and 2022 when rates became substantially less competitive, causing a shortage of nurses that led to increases in the waiting time for children in the hospital and causing more home placements to end because parents cannot continue to support their children at home.

The two versions of the model are contained in the table below. In the first version, the baseline scales the population to match that in California. The second version takes the parameters of the model and adjusts them upwards to simulate the effects of the nurse shortage. The factors that are adjusted include:

1. Increase in the likelihood of a delayed discharge,

2. Increase in the length of stay waiting for home nursing coverage,
3. Increase in the likelihood of readmission within 90 days, and
4. Increase in the likelihood of admission to the hospital of children who are being cared for at home.

Based on the data from Minnesota, we can differentiate the effects of these four cost sources between children who are newly authorized for home care and children in established home care settings. The new patients will have lengths of stay and delays while home care is being arranged that are greater than those children already being cared for at home who are admitted because of an acute condition that arose at home but then return once the condition is treated.

The Minnesota numbers are based on a year’s worth of hospitalization data in a set of Minnesota hospitals. Based on the reported incidence of hospitalization in this sort of population (13 percent), one can calculate the underlying population of children the Minnesota study group comes from. This estimated pool is about 1,600 children. We can estimate the comparable number of children in California by setting the number at the level that will generate spending for in-home care comparable to California’s spending for the G0300 code in 2020.^v This number is 4,400.

The model estimates the additional hospital days for a given percent increase in the level of the cost sources. For example, in the Minnesota base case, 2 percent of children admitted from a home care setting experienced on average a 1-day delay in discharge due to lack of nursing care at home. These parameters as well as others are adjusted upwards by an added 300 percent to provide estimates of delays during conditions of a shortage.

Table 2: California Hospital Cost Model

	Minnesota Study	California Model		
		300% increase in admission rates, readmission rates, and lengths of stay		
		Baseline	Shortage Conditions	Difference from Baseline
Total Population	1,608	4,400	4,400	-
New clients in hospital	54	167	167	-
Existing clients in hospital	131	405	2,121	1,716
Existing clients not hospitalized	1,423	3,828	2,112	(1,716)
Overall average LOS	113.4	113	59	
Total hospital days	20,979	64,865	135,735	70,870
Total in-home days	565,969	1,541,135	1,470,265	(70,870)
RN staff days		66,269	63,221	

LVN-G staff days		895,698	854,509	
LVN-S staff days		578,415	551,816	
Percent change in in-home days				-5%
Rate of admission for existing clients (Health Affairs article)	13%	13%	52.0%	39.0%
New Clients				
Delayed discharge per new client waiting for nurses (days)	26.5	26.5	106	79.5
New clients with delays due to nursing supply	46%	46%	100.0%	54%
Readmission rate for new clients	54%	54%	108.0%	54%
Days from increases length of delay				6,106
Days from increased likelihood of delay				9,557
Days due to increased readmissions				1,298
Total added days for new clients			16,961	
Existing Clients				
Delayed discharge waiting for nurses (days)	1.1	1.1	4.4	3.3
Share of existing clients with delays due to nursing supply	2%	2%	8.0%	6.0%
Readmission rate for existing clients	45%	45%	90.0%	45.0%
Readmission LOS for existing (days)	11.1	11.1	14.4	3.3
Days from increased length of delay				27
Days from increased likelihood of delay				107
Days due to increased readmissions				2,625

Likelihood of delay due to nursing supply			54%	
New admission LOS waiting for nursing			55.2	
Days due to increased likelihood of admissions				51,151
Total added days from existing clients				53,909
Waiting List				
New clients bed days waiting	658	2,035	16,961	
Existing clients bed days waiting	3	9	2,758	
Bed days of delay for increased admissions			51,151	
Waitlist	2	6	194	
Total added days				70,870
Cost profile at current in-home rate				
Hospital costs at \$6,909/day (Kaiser survey)		\$448,150,903	\$937,790,724	\$489,639,820
RN In-home care costs at \$60.84/hr; baseline at 7 hr/day; shortage at 5.5 hr/day		\$28,222,562	\$21,155,148	(\$7,067,414)
LVN-G In-home care costs at \$44.12/hr; baseline at 7 hr/day; shortage at 5.5 hr/day		\$276,627,514	\$207,355,235	(\$69,272,279)
LVN-S In-home care costs at \$44.12/hr; baseline at 7 hr/day; shortage at 5.5 hr/day		\$178,637,639	\$133,903,707	(\$44,733,932)
Total In-home nursing cost		\$483,487,716	\$362,414,091	(\$121,073,625)
Total cost		\$931,638,619	\$1,300,204,815	\$368,566,195

Cost profile with increased in-home rate				
Hospital costs at \$6,909/day (Kaiser survey)		\$447,956,309		(\$489,834,415)
RN In-home care costs at \$85.18/hr, 7 hr/day		\$39,513,443		\$18,358,295
LVN-G In-home care costs at \$61.77/hr, 7 hr/day		\$387,291,060		\$179,935,825
LVN-S In-home care costs at \$61.77/hr, 7 hr/day		\$250,100,793		\$116,197,085
Total In-home nursing cost		\$676,905,296		\$314,491,205
Total cost		\$1,124,861,604		(\$175,343,210)

The model generates estimates of hospital utilization increases as follows:

1. Added days for new clients because of delayed discharges due to lack of in-home nursing personnel. In this case the model assumes that the average delay increases to 106 days.
2. Added days because 100 percent of new clients will experience these delays.
3. Added days due to more 90-day readmissions. The model assumes that 108 percent will experience readmissions which means that some will be readmitted a second time.

All these three cost drivers result in an added 16,961 hospital days.

Second, the model estimates extra days for clients already participating in home care but who have been hospitalized. Again, the model accounts for added days due to the pressure caused by a nursing shortage. Under the 300 percent scenario they include:

1. Added Hospital days for existing clients because of delayed discharges due to lack of in-home nursing personnel. Few existing clients have delays under the baseline (2 percent) where the nursing supply is ample, and the delays are short (1.1 days). Here the 300 percent scenario of the model predicts that the duration and incidence increase by a factor of 3, resulting in average delays of 4 days for 8 percent of clients.
2. Added days due to a 90-day readmission rate of 90 percent. The model assumes that these readmissions will have lengths of stay that match that of other existing clients returning to the hospital (11.1 days) with the added 3.3 days that the shortage scenario predicts for delays in discharge for existing clients. Readmissions add 2,625 days.

The third element of increased hospitalization comes from an increase in the overall hospital admission rate for existing in-home clients. The nursing shortage increases pressure on families by failing to provide all the hours of nursing care approved for the

family and increasing the unexpected gaps that the family has to fill. This will result in increased readmission to hospital because of the failure of in-home nursing to provide reliable support for the family. The model assumes 54 percent of the at home children will return to the hospital. The likelihood of delayed discharge as well its duration are pegged at the average between the delays and duration of the existing and new clients. Some of these families will be readmitting their children for relatively short respite and will not lose the established home care structure they have in place. Others are returning their children to the hospital because their support structure is no longer in place, and they, much like new clients, will have delays in relocating required nursing staff. The model estimates that these clients account for an added 51,151 hospital days.

The total hospital days due to the 300 percent nurse shortage scenario is 70,870.

One additional cost factor affects total costs of nursing care. The nurse shortage can affect the number of hours each day that nurses are actually providing services in the home. During a shortage often families are not able to arrange for all of the daily hours that have been authorized. This shortfall in hours is absorbed by the family up to a point without resulting in the child returning to the hospital. To capture this phenomenon the model scores 5.5 hours of paid nursing during a time of shortage but 7 hours per day in the absence of a shortage.

Using the Model to Predict Responses to Medi-Cal Rate Increases

The model provides outputs that identify the consequences of nurse shortages of a specified degree. The baseline is a situation where rates paid for in-home care are fairly competitive and discharge delays are short for most, although longer for new clients who are establishing new home care settings. Recent experience with the response to changes in Medi-Cal rates provides the ability to estimate the relationship between Medi-Cal rates and the degree of nurse shortage for children on Medi-Cal. The 2018 rate increase put the nurse wage supported by the Medi-Cal rate at about the median market wage, and this situation is described in the baseline scenario. Since 2020, labor market conditions have imposed a shortage of in-home nursing care providers resulting in substantial decreases in in-home nursing. By adjusting the delayed discharge parameters of the model, it can simulate conditions with a substantial shortage, a decline in use of nurse personnel in the home, an increase in hospital use, and an increase in the number of children waiting for home placement. The shortage condition version of the model predicts both the number of children waiting for home placement and total in-home nurse expenditures.

We can compare the financial picture for the baseline without a nursing shortage to the picture when there is a nurse shortage that results in spending comparable to today in California. We can then estimate the cost of care for these children if the Medi-Cal rates were increased to relieve the shortage and return to the conditions described in the baseline – i.e., more in-home care and fewer hospital days. Based on the financial bottom line shown by the two versions of the models below, the shortage of nurses is costing

California \$175 million more than it would if the Medi-Cal rate were increased to alleviate the nurse shortage and allow children to return home.

Table 3: Costs Predicted With and Without Increased Rates

	With Current Shortage Conditions at Current Medi-Cal Rates	Without Shortage Due to 40% Medi-Cal Rate Increase	Net Cost/(Savings)
Total Hospital Cost	\$938 million	\$448 million	(\$490 million)
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A Medi-Cal rate increase of 40 percent could support an increase to establish nurse reimbursements that at least meet the median wage in all areas of the state. It would be sufficient to restore the balance between in-home and hospital care that existed in California in 2020.

This model relies on a relatively limited number of data points that reflect the actual service activities under Medi-Cal for children with complex medical conditions. It scales the expected impact of the current nursing shortage to match these data points and calculates the resulting impact on Medi-Cal spending. With additional data from the Medi-Cal program, these results could be further refined.

About the Author

- **David Maxwell-Jolly** has held a variety of executive state government positions including Chief Deputy Executive Director at Covered California, Undersecretary and Deputy Secretary at the Health and Human Services Agency, and Director of the Department of Health Care Services. He is a CalHPS Senior Advisor.

About the Sponsor

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ⁱ <https://labormarketinfo.edd.ca.gov/data/wages.html>

ⁱⁱ Children with Medical Complexity and Medicaid: Spending and Cost Savings, Jay G. Berry, et al.; Health Affairs, December 2014.

ⁱⁱⁱ Home Health Care Availability and Discharge Delays in Children With Medical Complexity, Roy Maynard, MD et al., PEDIATRIC.S Volume 143, number 1, January 2019: e20181951.

^{iv} Industry sources based on data from the state Department of Health Care Services.

^v The total nursing days are distributed across RN codes G0299 and S9123, LVN codes G0300 and S9124. Based on estimates reported by the industry, the total nursing services claimed include 4.3 percent for the two RN codes, 58.1 percent for LVNs under the G0300 code, and 37.5 percent for LVNs under S9124. There were a few additional claims for services from home health aides that amounted to less than 0.1 percent that were not included for consideration in the model. The claiming data available from Medi-Cal was limited to the G0300 code, so calibrating the model to reach the 4,400 total patient population was done solely based on the G0300 code.