

Cash, Cash Conversion Cycle, Inventory and COVID-19

Soumya Upadhyay, PhD, MHA¹, Dean G. Smith, PhD²

1. Department of Healthcare Administration and Policy, School of Public Health, University of Nevada Las Vegas, NV, USA
2. School of Public Health, Louisiana State University Health Sciences Center – New Orleans, LA, USA

Abstract

In recent years, hospital cash balances and cash conversion has been largely stable in Washington State hospitals, with the only increase coming in terms of increasing inventory. At current levels, cash is in short supply at many hospitals. While increasing inventory would appear to be a good move in light of the COVID-19 pandemic, inventory is not a single generic item. Hospital inventory is comprised of literally thousands of supplies and medications, only a few of which are critical. Hospital financial viability could be threatened by insufficient liquidity.

Keywords: COVID-19, liquidity, cash, inventory

Introduction

Much of the world has been suffering from COVID-19, causing concerns about hospital liquidity and an intense shortage of specific healthcare inventory. COVID-19 is a respiratory illness, which includes symptoms such as cough, fever, and shortness of breath. Symptoms can range from mild to severe. For severe cases, ventilators and associated supplies are required for respiration. With the COVID-19 pandemic, there have been hospitalizations and deaths in every state. In the State of Washington, which was the first epicenter in the United States, hospitalizations soared at the start of the outbreak. As of April 15, 2020, there have been 10,694 COVID-19 cases reported and 541 deaths due to COVID-19 in the State of Washington.

To contain the spread of this illness, which transmits easily through human contact, hospitals need personal protective equipment (PPE) for healthcare personnel. The Centers for Disease Control and Prevention (2020) requires the provision of appropriate PPE under workplace health and safety regulations. PPE used by healthcare workers at the start of the COVID-19 crisis include gloves, isolation gowns, facemasks, respirators, goggles, and face shields. Given the influx of COVID-19 patients at hospitals, both PPE and respiratory equipment have been in short supply. Additionally, while blood is not generally needed for COVID-19 patients, blood banks have had a limited supply

of blood because many community blood drives have been cancelled, and donors have been not donating blood due to fear of contracting this infectious disease.

Cash is also in short supply, raising concerns about the cash conversion cycle. For analytical purposes, liquidity in hospitals is typically measured by the current ratio, the quick ratio and days-cash-on-hand. In finance terms, the cash conversion cycle (CCC) indicates the difference in time between expenditures on medical inventory and services provided to patients, and the collection of revenues from those services. Prior work using data from the State of Washington, revealed that traditional liquidity ratios measure the effects of past actions while the CCC, as well as days-cash-on-hand, reflect the process by which liquidity is changing (Upadhyay & Smith, 2016). A shorter CCC indicates that a hospital is able to use inventory faster, and collect outstanding revenues sooner, relative to its payment on accounts. If inventory is limited and there are shortages, the CCC may lengthen. Efficient cash management implies that accounts are paid faster and there are reduced borrowing costs that may otherwise be associated with holding inventories. (Upadhyay, Sen & Smith, 2015)

Cash conversion is a component of working capital management. Working capital management is the management of all current assets and current liabilities. Working capital is directly influenced by managing the key non-cash components of current accounts, of which inventory is an important piece (Chen & Kieschnick, 2018). Hospitals may manage working capital with a focus on profitability and/or liquidity (Singh & Coleman-Lochner, 2020). In terms of inventories, a focus on short-run profitability may suggest that the supply of inventory should be high so that no patients are turned away due to reasons of insufficient medications or supplies. However, under the COVID-19 situation, inventory has been short and therefore, a lack of inventory would signal a less efficient cash conversion cycle.

Speculatively, if the levels of inventory in the state of Washington decrease with the COVID outbreak, the CCC will also go decrease. While a shorter CCC is appreciated, an optimal value of inventory is needed. Inventory should be at a level where the efficiency of internal operations is increased and hospitals are able to gain financial performance. Achieving an optimal level of inventory minimizes the carrying cost of inventory, and maximizes sales, profitability and market value of firms. Unusually low levels of inventory during the COVID outbreak would be a setback for hospitals' CCC. Current news reports indicate that nurses in Washington have protested the lack of protective medical gear and the dwindling supply of protective medical equipment has irked doctors and nurses across the country.

In this paper, we consider hospitals liquidity – with a focus on the CCC – and the role of inventory during the COVID-19 pandemic. Briefly, in recent years, hospital cash balances and CCC has been largely stable in Washington State hospitals, with the only increase coming in terms of increasing inventory. At current levels, cash is also in short supply at many hospitals. While increasing inventory would appear to be a good move in light of the COVID-19 pandemic, inventory is not a single generic item. Hospital inventory is comprised of literally thousands of supplies and medications, only a few of which are critical. Hospital financial viability can be threatened by insufficient liquidity.

Data and Methods

Financial information for all hospitals in the State of Washington are provided by the Department of Health, and available on-line (<http://www.doh.wa.gov/>). Data from 80 hospitals are available for the last 14 years, 2004 to 2017. Selected data elements were missing from 6 hospital-year observations. Since data were found to be missing at random, no attempt was made to either remove hospitals' other observations or fill-in missing values, leaving a sample of 1,114 hospital-year observations. Since data on *all* hospitals are available only as recently as 2017, there may be significant differences between the situation represented in the data and the actual situations hospitals found themselves in at the start of 2020.

For the purpose of this analysis, we examine cash holdings, the components of CCC, profitability, and financial viability. Cash holding are measured by Days Cash on Hand, which is calculated as cash and cash equivalents divided operating expenses per day, excluding depreciation and amortization.

The components of CCC are Days Patient Accounts Receivable (A/R), Days inventory and Payment Period. Days A/R is calculated as net patient accounts receivable divided by net patient revenues per day. For current analytical purposes, Inventory and the Payment Period are calculated as inventory and accounts payable, respectively, divided by net patient revenues per day. The managerial calculation of Inventory and Payment Period generally divide by cost of goods sold. With small profit margins, patient revenues and cost of goods sold are highly correlated and the use of patient revenues permits a straightforward summation of the three components of the cash conversion cycle.

Profitability is measured by the Operating Margin, which is normally calculated as the difference between a hospital's operating revenues and operating expenses (i.e. operating income) divided by operating revenues. The Operating Margin only considers revenue generated from hospital operations, that is revenues incurred from patient care (Bazzoli, et al., 2008).

Financial viability is a hospital's ability to generate and maintain an inflow of financial revenues more than the expenses. A Financial Viability index for hospitals is a composite measure of operating margin, Debt Ratio (long-term debt divided by total assets) and the Current Ratio (current assets divided by current liabilities). For purposes of the Financial Viability index only, the Operating Margin is reformulated as operating expenses divided by operating revenues. The specific formula of Carvava and Kudder (1978) is given as:

$$\text{Financial Viability} = \frac{4 \times \text{Debt Ratio} \times \text{Operating Margin}^4}{\text{Current Ratio}}$$

As an example, a hospital with a debt ratio of 0.5, an Operating Margin of 3% (normally calculated) or 0.97 (index calculated) and a current ratio of 1.5 would have a Financial Viability of 1.2. Lower is better. At an Operating Margin of 7% or 0.93, the hospital would have a Financial Viability of 1.0. There is nothing magical about this specific formula. One downside of this formula is that it can generate extreme values – likely to be incorrectly characterizing a hospital – if any of the

components takes an extremely low or high value. There is less concern about this formula when used in aggregate across a number of hospitals.

Results

Days Cash on hand, as measured on the cost reports of hospitals in Washington State has increased slightly since 2014, as presented in Figure 1. At an average of approximately 70 days cash, many hospitals were in adequate liquidity positions in the time period prior to the start of the COVID-19 crisis.

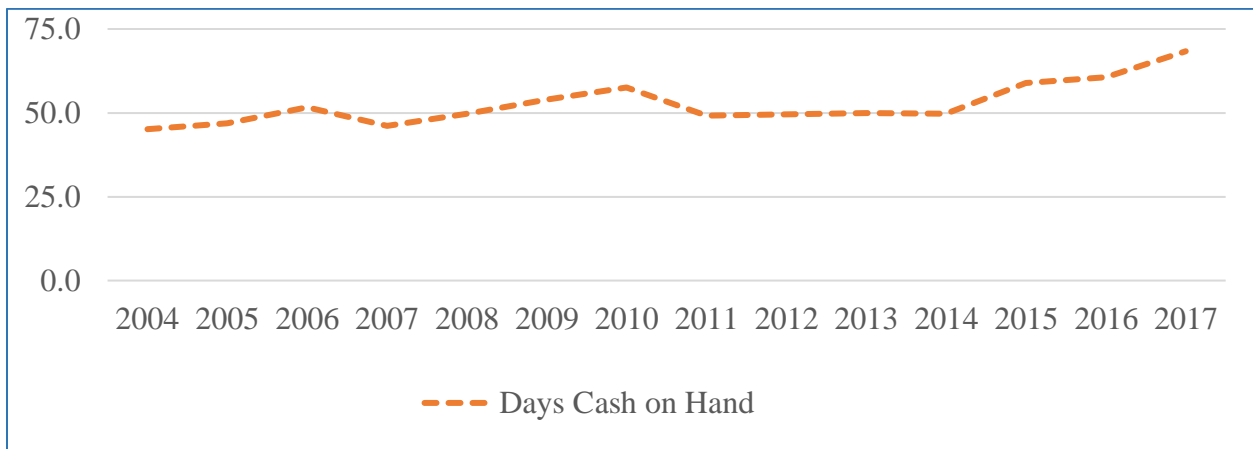


Figure 1. Days Cash on Hand in Washington State Hospitals, 2004-2017.

As shown in Figure 2, at Washington State hospitals, the cash conversion cycle is integrally tied with inventory. The cash conversion cycle is typically expected to be low when inventory moves faster and is converted to cash. Even though low inventory is desirable to maintain the rapidity of cash conversion cycle, the amount of inventory should not fall below sub optimal levels. With the COVID-19 situation, inventories are speculated to fall to inadequate levels, thus lowering the cash conversion cycle significantly. A very low cash conversion cycle may mean cash on hand is not readily available for capital planning and other purposes.

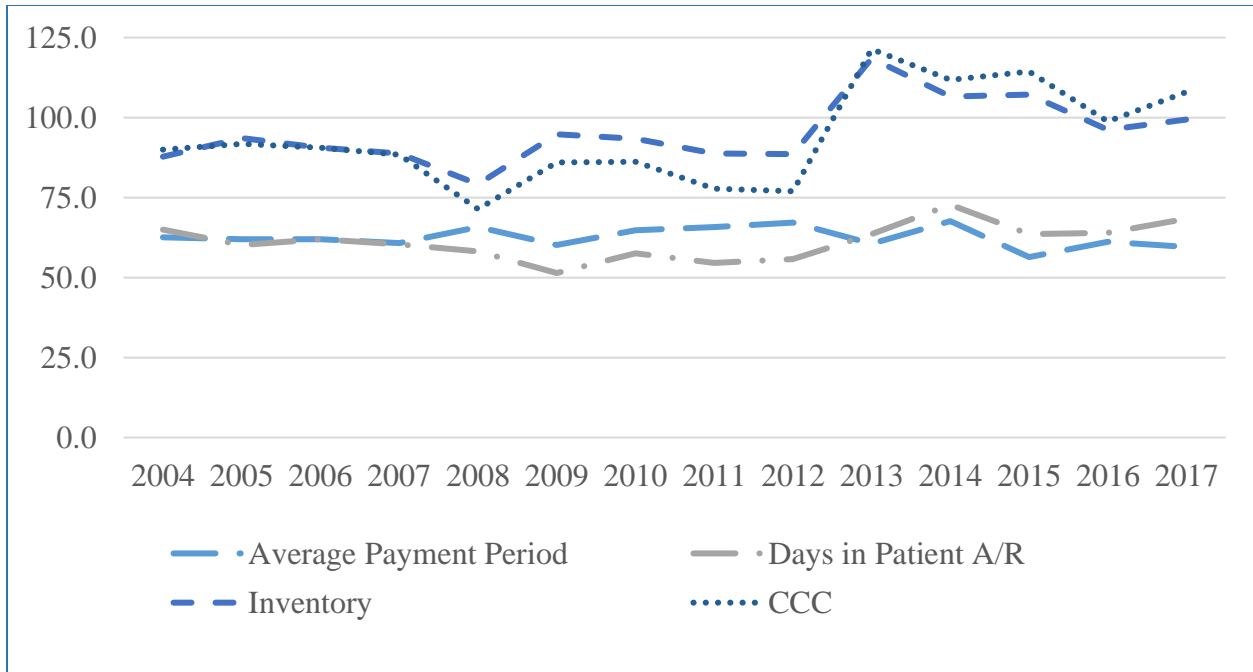


Figure 2. Cash Conversion Cycle and Components in Washington State Hospitals, 2004-2017.

At Washington hospitals, as shown in Figure 3, operating margins of hospitals have decreased from a long-run average of around 4% down to 0.3% in 2017. With a poor financial performance, Washington hospitals that are already burdened may get even more strained to maintain their sustainability by an influx of COVID patients.

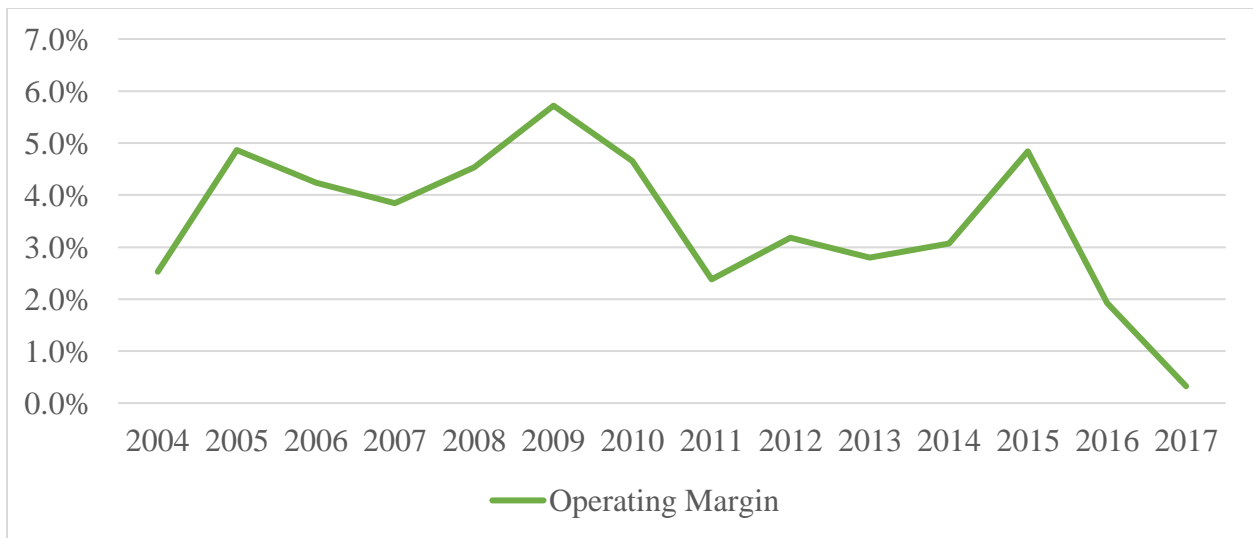


Figure 3. Operating Margin in Washington State Hospitals, 2004-2017.

Finally, as shown in Figure 4, the financial viability index of Washington state hospitals has a seemingly steady state of about 1.5, with a spike of up to nearly 8 after the financial crisis. Financial viability may falter because of several reasons, for instance, reduced reimbursement, increase in costs of medical technology. In the COVID-19 situation, inventory shortage (lower Current ratio) and high expense (lower Operating Margin) draws our attention to the maintenance of financial viability of hospitals. While hospitals need to provide excellent care to COVID patients, they also need to remain sustainable in the long run.

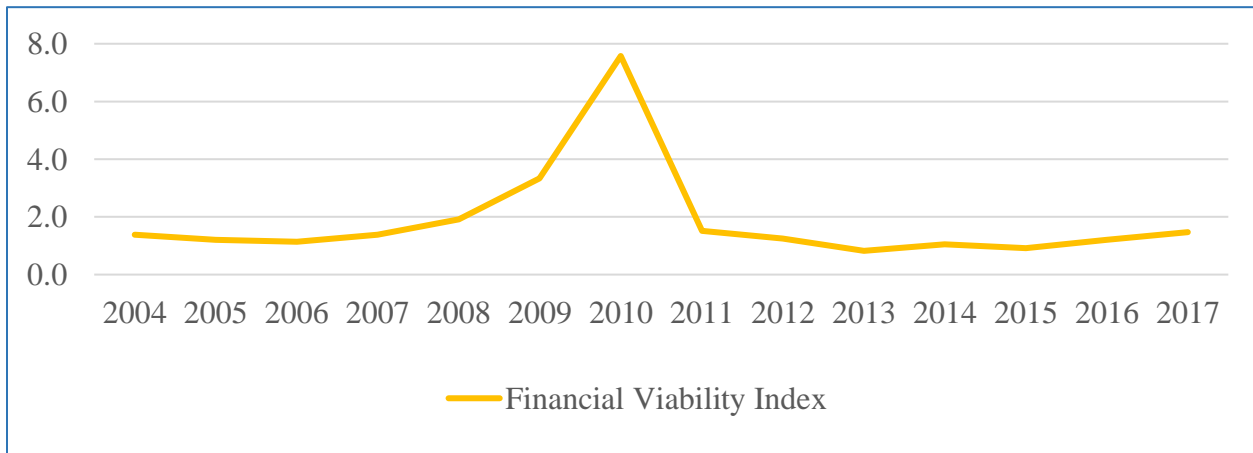


Figure 4. Financial Viability Index for Washington State Hospitals, 2004-2017.

Discussion

With an expectation of reductions in critical inventory, decreasing CCC and reduced Operating Margins, it is inevitable that there will be damage to the financial viability of hospitals. What are hospitals to do? While we are challenged to offer sound suggestions, several hospital leaders have offered constructive recommendations (Butcher, 2020). Among the recommendations related to CCC, two sound ones are: (1) Prioritizing payment of vendors, some of whom may willing to cooperate to lengthen the Payment Period and (2) Seeking advances from insurance companies to reduce Days Patient A/R. If hospitals are being paid lower or later from insurance companies, they may be in a position to facilitate some liquidity. Additionally, from an inventory standpoint, hospitals may need sufficient aid either from the federal government or from the state to obtain protective equipment, N95 masks, respirators, medicines and ventilators. While Washington has been in a fortunate position to return ventilators to the federal stockpile and donate ventilators to even more COVID-19 affected states such as New York, a continued flow of COVID cases in the WA hospitals does pose a burden on their existing inventory.

Conclusions

A low supply and shortage of inventory in Washington hospitals may affect their sustainability in the long term. A heavy influx of patients due to an increasing number of COVID infections entails a constant supply of protective personal equipment, ventilators, and testing kits. However, in the wake of the public health crisis, hospitals have been running low on inventory, which affects their cash conversion cycle. While it is desirable to have a shorter cash conversion cycle, it is also imperative for inventory to be optimal. Additionally, measures of financial viability and profitability indicate that Washington hospitals should focus on being sustainable in the near term.

References

- Bazzoli, G. J., Chen, H. F., Zhao, M., & Lindrooth, R. C. (2008). Hospital Financial Condition and the Quality of Patient Care. *Health Economics*, 17 (8), 977-995.
- Butcher, L. (2020). How Hospitals Can Preserve Cash Amid Rising Costs, Crashing Revenues Brought on by COVID-19. Healthcare Financial Management Association. Last accessed April 28, 2020: https://www.hfma.org/topics/news/2020/04/how-hospitals-can-preserve-cash-amid-rising-costs--crashing-reve.html?MessageRunDetailID=1735823770&PostID=14077472&utm_medium=email&utm_source=rasa_io.
- Carvava, R. A., & Kudder, G. (1978). Seeing Through the Figures with Ratios. *Hospital Financial Management*, 32 (6), 16-26.
- Chen, C., & Kieschnick, R. (2018). Bank Credit and Corporate Working Capital Management. *Journal of Corporate Finance*, 48, 579-596.
- Centers for Disease Control and Prevention. (2020). Coronavirus Disease 2019. Last accessed on April 9, 2020: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html>.
- Singh, S., Coleman-Lochner, L. (2020, March 31). Hospitals Burn Through Cash While Congress Weighs Next Stimulus. *Bloomberg News*. Last accessed April 14, 2020: <https://www.bloomberg.com/news/articles/2020-03-31/hospitals-burn-through-cash-while-congress-weighs-next-stimulus>.
- Upadhyay, S., Sen, B., & Smith, D.G. (2015). The Cash Conversion Cycle and Profitability: A Study of Hospitals in the State of Washington. *Journal of Health Care Finance*, 41 (4), 1-10.
- Upadhyay, S., Smith, D.G. (2016). The Impact of Hospital Liquidity On Cash Conversion Cycle: A Study Of Washington Hospitals. *Journal of Health Care Finance*, 42 (3), 146-154.

