



Provision of high-quality end-of-life care in a cost-effective work environment is the aim of all hospice organizations. This opportunity can be negatively affected when there is a limited supply of parenteral narcotics or administration routes are either not functional or fail to control symptoms. To combat these challenges, including a shortage of available parenteral narcotics, staff at a hospice organization adopted the use of a rectal catheter to deliver oral medications that were readily available. The implementation of a rectal catheter resulted in better control of symptoms, fewer titrations, and improvement in pain control and/or symptom management needs during end-of-life care management.

**AT A GLANCE**

- The Macy Catheter is a transformational prescription device that offers a safe and effective option to provide rectal access for administration of medications during end-of-life care management.
- A rectal catheter can be used for a subset of patients who are unable to swallow or who require timely, meaningful pain relief.
- Cost savings and improved nursing attitudes were noted one year after integration of rectal medication administration.

**KEYWORDS**

hospice; end-of-life care; pain management; rectal catheter; program development

**DIGITAL OBJECT**

**IDENTIFIER**

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# Macy Catheter

Integration and evaluation in a hospice setting to provide symptom relief during end-of-life care

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Hospice organizations strive to provide high-quality care and, to accomplish this goal, care teams rely on the availability of comfort medications, such as parenteral narcotics, to control symptoms at the end of life (EOL) (Bailey et al., 2014; Latuga et al., 2018; Paez et al., 2016). A 2017 hurricane that devastated Puerto Rico caused a shortage of parenteral narcotics at Ohio’s Hospice, a hospice organization in the southwest region of the state, leaving only a four-day supply for the organization. To combat this challenge, staff investigated the efficacy of a Macy Catheter as a delivery method for oral medications, which were readily available.

**Background**

Ohio’s Hospice is a statewide organization with nine affiliates serving 37 counties within the state. The Macy Catheter evaluation occurred at two of the nine affiliates. These two affiliates served 5,659 patients in 2019, with an average daily census of 1,100 patients in home care, long-term care, and one inpatient unit. Top terminal diagnoses include 36% cardiovascular, 31% cancer, and 11% nervous system diseases.

The Macy Catheter offers a safe, effective, convenient, and comfortable method for delivering crushed medications via the rectal route for symptom management (Lyons et al., 2015). Using the rectal route to administer medication in patients at the EOL is a beneficial option when the oral route fails, when parenteral narcotics

are not available, or when an alternate route is indicated. The walls of the rectum are highly vascularized, resulting in quick and effective absorption, likely related to avoiding the first-pass effect (Honasoge et al., 2016), and lead to improved symptom control and decrease the need for opioid titration and rotation (Lam et al., 2016; Latuga et al., 2018; Lyons et al., 2015; Paez et al., 2016).

**The Macy Catheter**

The Macy Catheter, invented by hospice nurse Brad Macy, BSN, BA, RN, CHPN®, received U.S. Food and Drug Administration approval in 2014 (BioSpace, 2014). The device is a rectal catheter inserted into the distal one-third of the rectum (see Figure 1). After placement, a 15 ml balloon is inflated to secure the catheter in the rectum. The port to administer medications is taped to a patient’s leg, fostering discreet medication delivery. The catheter and balloon are expelled during defecation. Oral medications are delivered by crushing them, creating a suspension in 10 ml of tap water, and injecting the solution into the administration port (Paez et al., 2016).

Use of the Macy Catheter improves care and comfort for patients and also benefits four major stakeholders: nurses, patients, caregivers, and hospice physicians. For example, Latuga et al. (2018) found that adoption of this device led to enhanced nursing efficiency with medication rounds, fostered a home-like setting, facilitated discharge options across multiple care settings, and decreased the need for continual opioid titration and rotation.

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**Transition to Practice**

Faced with an impending reality that the current practice of using parenteral narcotics for symptom management was no longer sustainable, the team (a hospice physician, pharmacist, and nurse educator) transitioned to the Macy Catheter. A train-the-trainer session was provided by a nurse specialist from Hospi Corporation, the company that manufactures the Macy Catheter. Staff education included interactive hands-on training related to medication delivery options. Additional information on Macy Catheter usage can be found at <https://bit.ly/3jeDsIB>.

**Adoption and Implementation Nursing Perceptions**

One year after integration of the Macy Catheter, a 10-question Likert-type survey was sent to 391 nurses working across different settings in two of the nine affiliates; 158 nurses (40%) participated in the survey. Settings included inpatient (44%), home care (39%), and both inpatient and home care (18%). Nurses' experience in the hospice setting ranged from less than 5 years (45%), from 5 to 10 years (29%), to greater than 10 years (27%). Nurses participating in the survey had cared for at least

one patient with a Macy Catheter; several nurses (22%) had taken care of more than 50 patients with a Macy Catheter. Because patients were transitioning to EOL care, the Macy Catheter was used to administer prescribed symptom management medications. Results of the survey are summarized in Table 1 and indicate positive nursing perceptions one year after implementation.

with poor IV access, eliminating the risks and complications of peripherally-inserted central catheter or central-line placement.

Hydration is also readily achieved using a rectal catheter. Bruera et al. (1998) found that patients can tolerate volumes as much as 400 cc per hour via a rectal catheter. In addition, hydration fluid delivered rectally does not need to be sterile. Tap water can

"Using the rectal route to administer medication to patients at the end of life is a beneficial option."

**Financial Impact**

During the first and second year after the implementation of Macy Catheter usage, internal data showed that parenteral medication use dropped significantly compared to the baseline number of vials used, along with a decrease in associated medication costs (see Table 2). Annual savings in associated medical costs during the first year were \$13,992, with annual savings of \$18,648.25 recorded in the second year, both compared to baseline numbers. This also included a notable decrease in number of vials used. These financial metrics do not include the cost of the Macy Catheter tray, which is approximately \$100, including all supplies needed to place the catheter and administer fluids and medications (Parker & Kreis, 2018). For hospice patients, reimbursement of the Macy Catheter is included in Medicare's hospice benefit stipend, a daily stipend used to capture services, medications, and durable medical equipment.

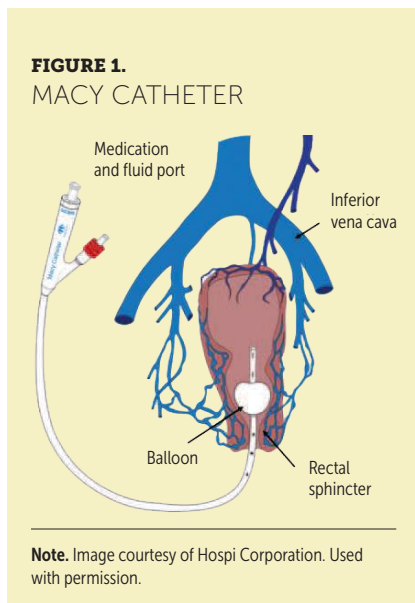
be administered, which is helpful when IV fluid availability is limited (Bruera et al., 1998; Lyons et al., 2015; Macygin et al., 2016). In the emergency department, consideration should be given to the use of the Macy Catheter for patients experiencing nausea or vomiting, patients who have a history of narcotic abuse, or patients who present with migraine headaches (Lyons et al., 2015). This application avoids IV placement and IV narcotic use.

**Case Study**

A 48-year-old hospice homecare patient with metastatic colon cancer was experiencing uncontrolled pain and agitation. His family had become physically and mentally exhausted providing care. The patient's EOL goal was to die peacefully in any care setting that could meet his symptom management needs. In an effort to gain symptom control, crisis care staff were placed in the home to provide around-the-clock (ATC) care. Despite this effort, the patient's symptoms remained uncontrolled and he was transferred to the inpatient unit.

The use of the Macy Catheter in oncology nursing practice is easily transferable to other clinical settings, specialties, and patient populations. Rectal administration as a safe route of medication delivery can be relevant during any serious illness or when the oral route is compromised. This device can also be considered in populations

The patient's symptoms remained uncontrolled eight hours after inpatient admission. During those eight hours, the patient received hydromorphone 72 mg via IV, haloperidol 40 mg via IV, and



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**TABLE 1.**  
NURSING SURVEY REGARDING MACY CATHETER USE (N = 158)

QUESTION	n	%
<b>The Macy Catheter, when compared to sublingual medications, is</b>		
Less effective than sublingual medications	2	1
Equally as effective as sublingual medications	30	19
More effective than sublingual medications	114	72
I don't have enough experience with sublingual medications to answer.	12	8
<b>The Macy Catheter, when compared to sublingual medications, is</b>		
Less comfortable for the patient than sublingual medications	6	4
Equally as comfortable for the patient as sublingual medications	40	25
More comfortable for the patient than sublingual medications	103	65
I don't have enough experience with sublingual medications to answer.	9	6
<b>The Macy Catheter, when compared to subcutaneous medication injections, is</b>		
Less effective than giving subcutaneous injections	10	6
Equally as effective as giving subcutaneous injections	54	34
More effective than giving subcutaneous injections	70	44
I don't have enough experience with subcutaneous medications to answer.	24	15
<b>The Macy Catheter, when compared to subcutaneous medication injections, is</b>		
Less comfortable for the patient than subcutaneous medications	4	3
Equally as comfortable for the patient as subcutaneous medications	20	13
More comfortable for the patient than subcutaneous medications	111	70
I don't have enough experience with subcutaneous medications to answer this question.	23	15
<b>Patients and/or their caregivers/family members are (N = 154)</b>		
Less resistant to the Macy Catheter than I expected	50	32
As accepting of the Macy Catheter as I expected	76	49
More resistant to the Macy Catheter than I expected	28	18
<b>The Macy Catheter is (N = 157)</b>		
Less effective at symptom management than I expected	4	3
As effective as I expected in the symptom management of my patients	48	31
More effective at symptom management in my patients than I expected	105	67
<b>If asked by a family member whether they should consider the Macy Catheter for a loved one in hospice care, I would tell them (N = 156)</b>		
The Macy Catheter works, but I recommend subcutaneous injections or an IV for symptom management.	4	3
The Macy Catheter works for symptom management.	152	97
<b>Note.</b> Because of rounding, percentages may not total 100.		

**TABLE 2.**  
VIALS USED AND COST SAVINGS PRE- AND POSTIMPLEMENTATION

MEDICATION	VIALS USED			COST (\$)		
	PRE (JULY 2016 TO JUNE 2017)	POST (JULY 2018 TO JUNE 2019)	POST (JULY 2019 TO JUNE 2020)	PRE (JULY 2016 TO JUNE 2017)	POST (JULY 2018 TO JUNE 2019)	POST (JULY 2019 TO JUNE 2020)
Hydromorphone (2 mg/ml, 1 ml vial)	15,533	4,235	3,664	6,213.20	1,694.00	1,465.60
Methadone (10 mg/ml, 20 ml vial)	32	20	9	12,696.00	7,935.00	3,570.75
Morphine (10 mg/ml, 1 ml vial)	17,371	1,665	1,453	5,211.30	499.50	435.90
Total	-	-	-	24,120.50	10,128.50	5,472.25

**Note.** July 2017 to June 2018 has combined data from pre- and postimplementation assessment and, therefore, was excluded from this table. Internal data courtesy of Ohio's Hospice pharmacy.

midazolam 48 mg via IV. Despite receiving high doses of symptom management medications, the patient remained agitated and restless. With nothing to eat or drink for six days, he began to transition to EOL care but was still alert enough to yell out in pain. Having no symptom relief in sight, and the need for a rapid solution, the Macy Catheter was prescribed and placed in the patient's retained rectum. A symptom management regimen was initiated, including the following medications:

- Methadone 10 mg via rectum every four hours
- Dexamethasone 4 mg via rectum per day
- Phenobarbital 32.4–64.8 mg via rectum every four hours ATC and every two hours PRN
- Quetiapine 100 mg via rectum every four hours ATC and every two hours PRN
- Diazepam 10 mg via rectum every two-hours PRN
- Hydromorphone 10 mg via IV or subcutaneous each hour PRN
- Midazolam 10 mg via IV or subcutaneous each hour PRN

The patient began receiving symptom relief within 20 minutes of the first dose. The primary nurse observed the patient becoming more relaxed, no longer crying out, and no longer attempting to get out of bed. Documentation in the Pain Assessment in Advanced Dementia Scale showed a

decrease in the symptom intensity score from 10 to 3 during this intervention.

Twelve hours after placement of the Macy Catheter and starting the symptom management regimen, the patient experienced meaningful symptom relief and complete comfort had been achieved. The use of this device to deliver medications ATC provided rapid, improved symptom control with a significant decrease in the amount of PRN medications. During a 12-hour time frame after placement, the following PRN medications were required:

- Two doses PRN hydromorphone 10 mg via IV
- One dose PRN phenobarbital 32.4 mg via rectum
- One dose PRN diazepam 10 mg via rectum

Surrounded by family, the patient passed away comfortably later that evening.

**Further Evaluation**

Further evaluation is being conducted by the authors, including how implementation of the catheter has affected efficiency in nursing practice and care delivery, the ease of use by the patient's family, and the satisfaction of hospice physicians with the Macy Catheter. In addition, more precise financial metrics related to cost-benefit analysis need to be monitored as use is replicated in other organization affiliates.

**Conclusion**

Based on evaluation data, implementation of the Macy Catheter in clinical use with hospice patients has been shown to facilitate effective symptom management, with patients reporting positive experiences with the catheter. Cost data from Ohio's Hospice indicated a significant drop in parental medication use compared to baseline, confirming that the Macy Catheter is a cost-effective option in clinical practice.

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