

# Simply add water

Hydration to maintain fluid  
balance, flushing to keep  
tubes patent.



# The vitality of water

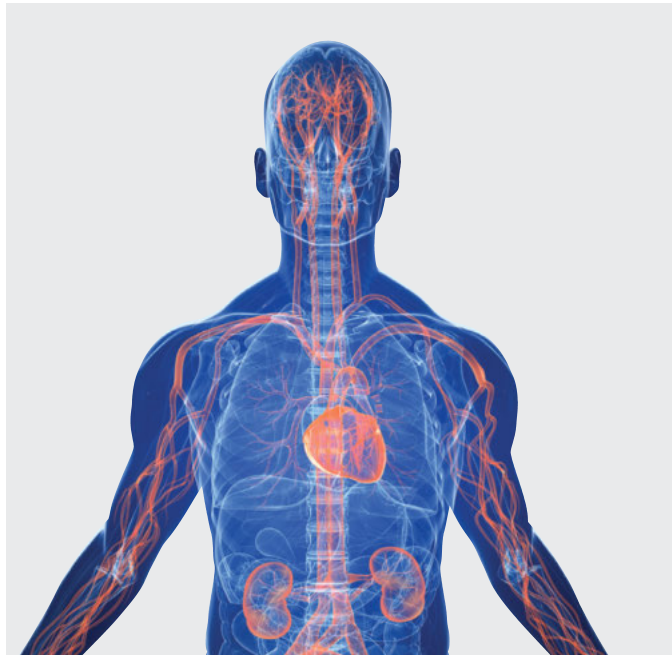
- Water is vital for the body
- Water is vital for the geriatric patient
- Water is vital for the tube fed patient



# The vitality of water

## Water is vital for the body

Accounting for roughly 60% of body weight, water is the largest component of the human body and the major constituent of cells, tissues and organs.



- Water is essential for cellular homeostasis



- Water serves as the basis for the key transport systems (e.g., blood, lymphatics, urine, digestive fluids)



- Water acts as a thermal buffer to regulate body temperature<sup>1</sup>

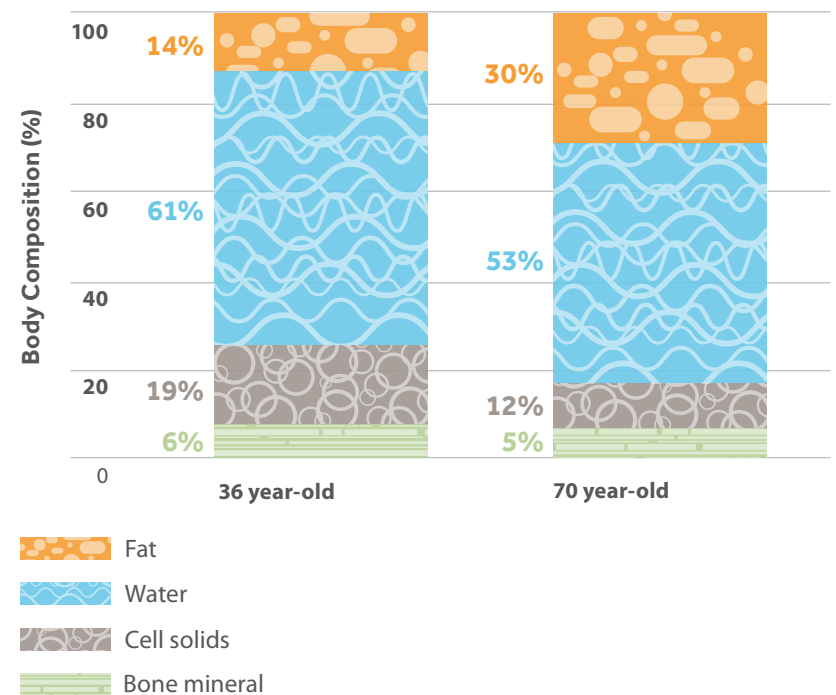
## ...and for the geriatric patient

Age-related changes make older adults even more vulnerable to shifts in water balance that can result in dehydration.

## Risk factors for elderly patients

- Decreased thirst sensation
- Total body fluid decrease
- Decline in kidney function
- Functional limitations (dysphagia, stroke, etc.)

## Aging and body composition\*



\* Hickson M. Malnutrition and ageing. Postgrad Med J. 2006;82:2-8.

## In the tube fed patient, water serves two important purposes:

### Water is vital for the tube fed patient

For tube fed patients who rely completely on prescribed enteral nutrition and water flushes to meet nutritional requirements, hydration status and fluid management can become even more critical contributors to quality care and positive outcomes.

1

**Flushing to maintain tube patency.**

2

**Hydration to maintain fluid balance in the body.**



### Challenges to fluid management in tube fed patients:

- Mechanisms that regulate hydration are often diminished.
- Manual flushes can be extremely time consuming.
- Comorbidities can increase the likelihood of dehydration.
- No single standard for calculating hydration requirements exists.
- Enteral nutrition and medication flushes often do not meet hydration needs.

# The consequences of poor fluid management

- Economic consequences
- Increased morbidity
- Increased mortality



# The consequences of poor fluid management

In 2008, the agency for healthcare research and quality estimated the annual costs of hospital charges related to dehydration to be approximately

**\$1.6 billion.<sup>2</sup>**

## The consequences of poor fluid management

### Increased costs

#### Increased hospital admissions

- The AHRQ lists dehydration as one of the top 10 most common diagnoses resulting in preventable hospitalization.<sup>2</sup>
- Using national survey data, Kayser-Jones et al. observed an average length of stay of 6,5 days in 208,000 elderly patients with a principal diagnosis of dehydration.<sup>3</sup>

#### Increased tube replacement costs

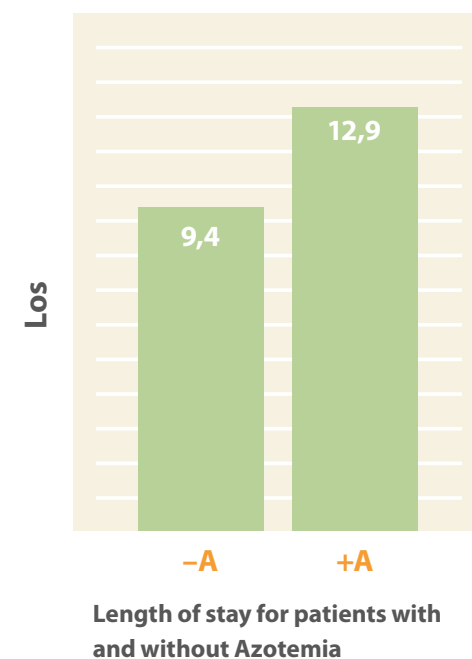
- Clogged tubes may result in tube replacement. Material, labor and x-ray costs can cost hundreds of dollars per incident.

#### Increased risk of hospital-acquired conditions

- Dehydration can increase the risk of falls, pressure ulcers, CAUTIs, SSIs and DVTs.

#### Increased length of stay

- Dehydration may contribute to increased LOS.
- In a review of elderly orthopedic patients, Mukand et al. observed significantly longer LOS in patients with dehydration markers.<sup>4</sup>



# The consequences of poor fluid management

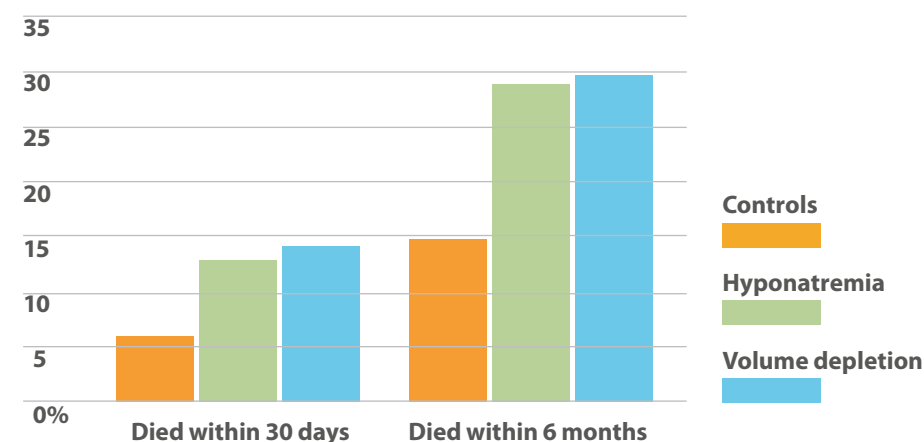
## The consequences of poor fluid management

### Mortality

#### Dehydration may contribute to increased mortality rates:

In a four-year medical record review of 15,146 hospital admissions, Wakefield et al. observed significantly higher mortality rates among patients who developed dehydration during their hospital stay versus a control group.<sup>5</sup>

#### 30 day and 6 month post discharge mortality by status<sup>5</sup>



"Patients with either dehydration code were almost twice as likely to die after hospital discharge."<sup>5</sup>

In a seven-year review of Medicare beneficiary hospitalizations, Warren et al. observed post admission mortality rates of 50% within one year in elderly patients and significantly higher mortality rates across an array of principal diagnosis categories.<sup>6</sup>

Early and Late Mortality Rates for Selected Principal Diagnosis Categories Among Elderly Medicare Beneficiaries Hospitalized With and Without a Concomitant Diagnosis of Dehydration

Principal Diagnosis Category	30-Day Post Admission Mortality Rate*	Increase in Mortality Rate %**	31 - 365 Day Post Admission Mortality Rate*	Increase in Mortality Rate %**
<b>Dehydration</b>	17,4		30,6	
<b>Respiratory illness</b>				
Without dehydration	10,9		17,7	
With dehydration	18,9	73%	23,9	35%
<b>Other GI conditions</b>				
Without dehydration	4,9		10,2	
With dehydration	8,8	80%	18,1	77%
<b>Urinary system infections</b>				
Without dehydration	7,2		18,2	
With dehydration	11,5	60%	29,6	63%
<b>Cancer</b>				
Without dehydration	14,1		25,9	
With dehydration	45,2	221%	40,4	56%
<b>Sepsis</b>				
Without dehydration	22,5		20,9	
With dehydration	29,5	31%	27,2	30%
<b>Cardiac</b>				
Without dehydration	10,4		14,9	
With dehydration	22,8	119%	26,5	78%
<b>Frailty</b>				
Without dehydration	16,9		29,4	
With dehydration	25,5	51%	36,1	23%
<b>Diabetes</b>				
Without dehydration	5,1		13,7	
With dehydration	8,9	75%	18,1	32%

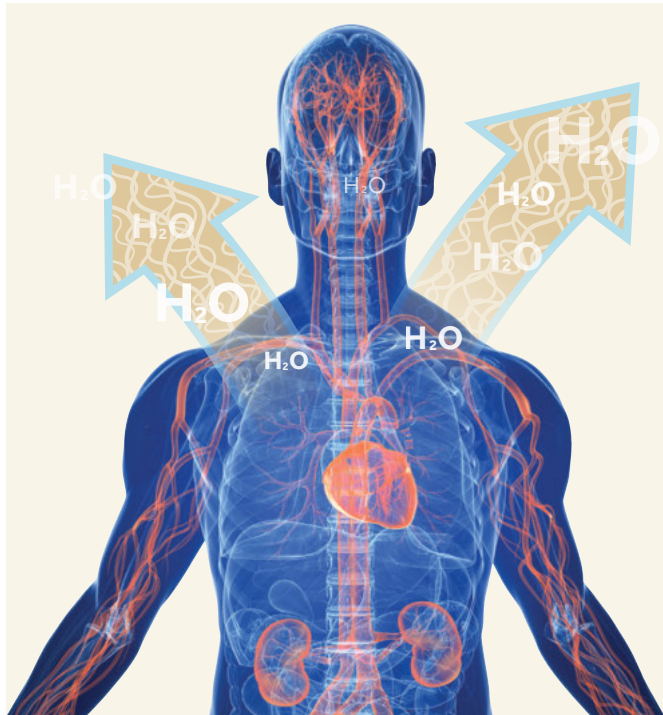
\* Per 100 hospitalizations. Adjusted for age, race and sex.  
 \*\* Reference group  
 \*\*\* % derived from data

# The consequences of poor fluid management

## The consequences of poor fluid management

### Morbidity

**Dehydration may contribute to increased morbidity:**



### Pressure ulcers

Poorly hydrated individuals may be twice as likely to develop pressure ulcers because dehydration reduces the padding over bony points.<sup>7</sup> Fluid intake to correct impaired hydration increases levels of tissue oxygen and enhances ulcer healing.<sup>8</sup>

Risk Factors Associated With Decubitus Ulcer  
In An Institutionalized Elderly Population (N=827)

#### Decubitus ulcer

	Absent	Present %	Increase	P Value
Dehydration (%)	12,5	22,9	83%	0,0002
Immobility (%)	5,4	87,4	93%	0,0000
Edema (%)	30,3	50,5	67%	0,0000
Poor circulation (%)	54,4	71,1	31%	0,0000

Casimiro et al. collected information from 827 elderly institutionalized patients and investigated the prevalence and risk factors of decubitus ulcers.

In this study, poorly hydrated individuals were twice as likely to develop pressure ulcers.<sup>7</sup>

### Urinary tract infections

Water helps maintain a healthy urinary tract and kidneys. Maintaining adequate hydration levels, may be important in the prevention of urinary tract infection.<sup>11</sup>

### Falls

Dehydration has been identified as one of the risk factors for falls in older people, since it can lead to a deterioration in mental state, and increase the risk of dizziness and fainting. The maintenance of adequate levels of hydration in older people could be effective in preventing falls, particularly as part of a multifactorial falls prevention strategy.<sup>12</sup>

### Hospitalization

Dehydration has been shown to increase by two-fold the mortality of patients admitted to hospital with stroke. It also increases the length of hospital stay for patients with community-acquired pneumonia.<sup>13</sup>

### Constipation

Inadequate fluid intake is one of the most frequent causes of chronic constipation.<sup>9</sup> It is more frequent in incapacitated or institutionalized older people, affecting some 42 percent of patients admitted to geriatric units.<sup>10</sup>



# The KANGAROO™ solution

- The Kangaroo™ ePump and Kangaroo™ Joey Feeding Pumps
- Hydration to maintain fluid balance in the body
- Flushing to keep your tubes patent



# The Kangaroo™ solution

## Kangaroo™ ePump

### Enteral Feeding Pump

The right pump for acute and long-term care centers

- Fully programmable variable feed and flush
- Attitude Independent
- ATM style interface
- 72 hr. feeding history
- 15 Languages
- Auto-prime capabilities
- Weight: 2.4 lbs
- Accuracy: +/- 10%
- Battery Life: 15 hrs



*When patients require nutrition, flushing and hydration the Kangaroo™ ePump enteral feeding pump offers continuous and intermittent feed and flush in one compact, easy-to-use device.*

## Kangaroo™ Joey

### Enteral Feeding Pump

The right pump at home and on the go

- Fully variable feed and flush
- Attitude Independent
- ATM style interface
- 72 hr. feeding history
- 15 Languages
- Auto-prime capabilities
- Shock and water resistant
- Weight: 1.7 lbs
- Accuracy: +/- 7%
- Battery Life: 18 hrs



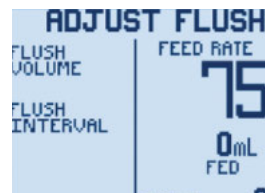
*The first flushing and hydrating ambulatory device, the Kangaroo™ Joey feeding pump can be programmed to deliver the optimal amount of nutrition and pre-programmed hydration, helping to ensure patients stay well-nourished, perfectly hydrated, while providing patients with freedom and mobility.*

## Kangaroo™ Feeding Pumps

Kangaroo™ has been a trusted name in Enteral Feeding for over 30 years and our market leading pumps are here to stay. The latest Kangaroo™ generation of pumps features two highly sophisticated, yet surprisingly easy to use feeding pumps loaded with an impressive array of identical features as well as a set of subtle differences that matter to patients and caregivers.

### Kangaroo™ Feeding Pumps provide:

#### Flushing & hydration



Fully programmable variable flush and hydration functions save nursing time and allow clinician to set a distinct flush rate and interval based on a patient's specific needs.

#### Ease of use



ATM-style interface makes programming the pump intuitive, easy and quick, all while enhancing proper programming inputs and one handed operation.

#### Efficiency



Auto-priming reduces the time consumed by manual priming and allows the clinician to maximize nursing time.

#### Anti-free flow protection



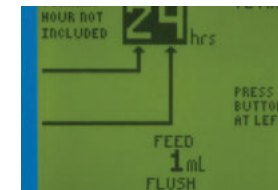
Anti-free flow sets provide over infusion protection.

#### Flexibility



Regardless of operating orientation Kangaroo™ pumps will continue to infuse formula and water at the programmed rate.

#### Confidence



72 hr. history provides hour by hour breakdown of nutrition and water delivered, giving you the confidence to know that your patient's nutritional needs were met.

Meet total hydration needs for a variety of common flushing orders.

No other pump provides this level of variable programmability.



Can your pump do this?

## Hydration to maintain fluid balance in the body

Cardinal Health's pumps feature variable programmable hydration capabilities that are flexible enough to meet the challenge of your patient's unique hydration needs.

### Bolus flush orders:

- For patients who require bolus tube feeding
- Programmable rates and intervals aligned to feeding schedule

### Intermittent flushing:

- For patients who require cyclic or nocturnal feedings
- Intervals of 1-24 hours and rates of 10-500 mL

### Small volumes throughout the day:

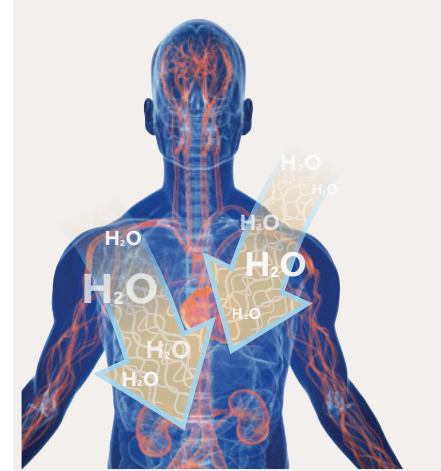
- For patients who cannot tolerate high volumes
- Deliver water at volumes as low as 10 mL per interval

### I/O Accountability:

- For patients with strict I/O requirements
- 72 hour history provides hour by hour breakdown of water delivered

### Fluid deficiency corrections:

- For patients who require large volumes to correct fluid deficiencies
- Programmable flush volumes of up to 500 mL per interval



## CASE STUDY: A mechanically ventilated ICU patient with euvolemic hypernatremia requires enteral nutrition.

### Estimated nutrient needs:

Kilocalories: 2300-2500  
Fluid mL: 2250-2600

### Tube feeding order:

Standard 1.2 formula  
Continuous at 85 mL/h

### Tube feeding provides:

2448 kcals  
1672 mL formula free water

### Water deficit needs:

Formula deficit: 776 mL  
Free water deficit: 1100 mL  
Total deficit: 1876 mL

### Free water flush order:

240 mL every 3 hours

# The Kangaroo™ solution

## Flushing to keep your tubes patent

Clogged feeding tubes are a common challenge occurring in as many as 35% of tube fed patients.<sup>14</sup> Cardinal Health's Kangaroo™ ePump and Kangaroo™ Joey pumps offer numerous customizable flushing features to help you meet ASPEN Guidelines and maintain tube patency.

## Kangaroo™ Feeding Pump capabilities

### Programmable automated flush

- An average manual flush can take between 10 minutes and 60 minutes of nursing time per day.
- The Kangaroo™ pump's automated flush feature helps attain ASPEN guidelines and reduce nursing burdens.

### Flush now after GRV

- Gastric residual volume checks can result in clogged tubes if not flushed.
- The Kangaroo™ solution offers the "flush now" feature at the push of a button to clear lines after GRV checks.

### Variable flush rates

- For patients who require low water volumes, the programmable automated flush can be programmed to rates as low as 10 mL per interval.

### Flush now after meds

- Medication delivery can result in clogged tubes if not flushed properly.
- The Kangaroo™ solution offers the "flush now" feature at the push of a button to clear lines after medication delivery.

## ASPEN guidelines

- Flush feeding tubes with 30 mL of water every 4 hours during continuous feeding or before and after intermittent feedings in an adult patient.
- Flush the feeding tube with 30 mL of water after residual volume measurements in an adult patient.
- Flushing of feeding tubes in neonatal and pediatric patients should be accomplished with the lowest volume necessary to clear the tube.
- Adhere to proper tube flushing protocols before and after medication administration.



## Product codes

Nutritional delivery/enteral nutritional delivery pumps and sets

### Kangaroo™ ePump enteral feeding pump

Code	Description	Sales unit
482400J	Kangaroo™ ePump including pole clamp, power adaptor and operating manual	1

### Kangaroo™ ePump accessory products

Code	Description	Sales unit
382491	Power adaptor	1
382492	Pole clamp	1
1041411	Battery pack	1
382493	Plug attachment set	1

### Kangaroo™ ePump feeding sets, DEHP-free PVC, sterile

Code	Description	Sales unit
777401	ENPlus spike set	30
777403	ENPlus 3-in-1 set	30
777064	500 ml set	30
777106	1000 ml set	30
777163	1600 ml set	30
777402	Dual ENPlus spike set	30
777056	100 ml burette set	30
1814717995	Kangaroo™ 3-in-1 adaptor	50
778104	1000 ml feed & 1000 ml flush set	30
778161	1600 ml feed & 1000 ml flush set	30
777405	ENPlus spike & 1000 ml flush set	30
777407	ENPlus spike feed & vented spike flush set	30
777406	ENPlus 3-in-1 & 1000 ml flush set	36
777408	ENPlus 3-in-1 feed & 3-in-1 flush set	30



## Product codes

Nutritional delivery/enteral nutritional delivery pumps and sets

### Kangaroo™ Joey enteral pump feeding sets, DEHP-Free PVC, sterile

Code	Description	Sales unit
777501	ENPlus spike set	30
777502	Dual ENPlus spike set	30
666064	500 ml set	30
666106	1000 ml set	30
666163	1600 ml set	30
777503	ENPlus 3-in-1 set	30
777505	ENPlus spike & 1000 ml flush set	30
777507	ENPlus spike feed & vented spike flush set	30
668104	1000 ml feed & 1000 ml flush set	30
777506	ENPlus 3-in-1 & 1000 ml flush set	36
777508	ENPlus 3-in-1 feed & 3-in-1 flush set	30



### Kangaroo™ Joey enteral pump accessory products

Code	Description	Sales unit
382491	Power adaptor	1
383493	Pole clamp	1
F010506	Battery pack	1
382493	Plug attachment set	1
770026	Mini backpack – blue	1
770028	Super mini backpack – blue	1
770034	Mini backpack – pink	1
770029	Super mini backpack – pink	1
770036	Large backpack – black	1

### Kangaroo™ Joey enteral feeding pump

Code	Description	Sales unit
383400	Kangaroo™ Joey Enteral Feeding Pump including pole clamp, power adaptor and operating manual	1





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