



Red Dinnerware for Residents Living with Dementia

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Introduction

The prevalence of dementia and related cognitive impairments is increasing rapidly among Canada’s aging population, presenting significant challenges for long-term care systems. As of January 2025, an estimated 771,939 Canadians are living with dementia, with projections suggesting that more than 1.7 million could be affected by 2050 [1, 2]. By the 2040s, over 20,000 new diagnoses are expected each month nationwide, with Ontario, Quebec, British Columbia, and Alberta projected to experience the largest increases due to population group and accelerated aging [1, 3]. In Alberta specifically, the number of people living with dementia is expected to increase by 286% between 2020 and 2050 [1].

Further, dementia is “not a normal part of aging”, though its prevalence rises with advancing age [4]. In the 2023-2024 fiscal year, the Canadian Chronic Disease Surveillance System identified 499,905 cases among individuals aged 65 years and older [2]. 3 in 4 people with dementia were aged 75 years or older at the first time of diagnosis, with average ages of 81 for women and 79 for men [4]. By 2050, approximately one million Canadian women are expected to be living with dementia, reflecting both their longer life expectancy and the overall growth of the aging population [1].

As dementia progresses, individuals frequently experience changes that directly affect eating and drinking, including reduced appetite, impaired attention, and difficulties with visual perception and object recognition [5]. These challenges can contribute to decreased nutritional intake and increased risk of malnutrition in continuing care settings. Declines in contrast sensitivity and figure-ground discrimination may make it difficult for individuals to distinguish food from the plate or the plate from the surround environment, thereby reducing engagement with meals and limiting independent eating [5].

In response, growing attention has been directed toward environmental and design-based interventions that support mealtime functioning. Among these, the use of coloured or high-contrast dinnerware, most notably red dinnerware, has been proposed as a practical strategy to enhance visual clarity and

promote food intake. By improving the perceptual distinction between food and its background, such interventions aim to support recognition, attention, and overall engagement during meals. The following review examines the evidence surrounding red and other coloured dinnerware in dementia care, with a focus on their impact on nutritional intake and mealtime experience.

Dementia-Related Challenges

Individuals living with dementia experience a range of cognitive, behavioural, and perceptual changes that can significantly affect daily activities, including eating and drinking. These challenges are often interconnected, with impairments in attention, perception, and object recognition contributing to difficulties during mealtimes. As a result, individuals may struggle to engage with food, recognize items, or complete the tasks required for independent eating [6]. Understanding these underlying challenges is essential for identifying targeted interventions that can support nutritional intake and improve the overall mealtime experience.

Reduced Nutrition Intake

Reduced food and fluid intake is a well-documented concern among individuals living with dementia and is a significant contributor to malnutrition in continuing care settings [7]. The risk of malnutrition is heightened by a combination of dementia-related physical and psychological changes alongside age-related vulnerabilities [8]. Estimates suggest that up to one-third of individuals with dementia are malnourished, with nearly half at risk, and significant weight loss affects approximately 40% of those with Alzheimer's disease (AD) [9, 10]. These outcomes are associated with serious health consequences, including increased morbidity and mortality, functional decline, higher rates of hospitalization, and longer lengths of stay [9, 11]. Malnutrition has also been linked to development of delirium and accelerated disease progression, further compounding care needs [9].

The causes of reduced intake in dementia are multifactorial. Feeding difficulties may arise from deterioration in motor and cognitive abilities, including challenges with task sequencing, forgetting to eat, failure to recognize food, and conditions such as dysphagia [11]. Dietary habits are



further influenced by a wide range of factors, from appetite and taste changes to food availability and preparation [12]. Assessing malnutrition in this population is complex, as no single measure fully captures nutritional status; while comprehensive assessment may include dietary, anthropometric, biochemical, functional, and clinical indicators, it is often simplified in practice to measures such as low body weight [11].

Importantly, the mealtime experience itself is a complex and influential factor in nutritional intake. Dining is shaped not only by the food provided but also by environmental and social elements, including the physical setting, atmosphere, level of personal support, and opportunities for social interaction [8]. Within continuing care, this highlights the need to consider residents as active participants in the dining experience, with preferences and perceptions that influence engagement and intake [11]. Environmental factors such as lighting, noise, table setting complexity, and food presentation can either support or hinder the ability to eat independently. For example, simplifying place settings, minimizing distractions, and ensuring adequate lighting have been identified as practical strategies to improve mealtime engagement [12].

Vision and Perception Changes

Dementia is associated with a range of visual and perceptual impairments that extend beyond normal age-related changes and causes anxiety, disorientation, and sometimes a loss of appetite [9, 13]. The retina, which consists of multiple layers of neurons including photoreceptor cells (rods and cones) and bipolar cells, plays a critical role of visual processing [14]. Cone cells are responsible for photopic (daylight) vision and enable colour perception by responding to different wavelengths of light, typically corresponding to red, green, and blue [14]. In AD, impairment in colour vision has been linked to retinal changes, including the loss of retinal ganglion cells, which can disrupt visual signal transmission and contribute to reduced visual accuracy [14].

In addition to physiological changes, dementia can affect higher-level perceptual and cognitive processes involved in interpreting visual information. For example, individuals with semantic dementia experience a

progressive loss of conceptual knowledge about everyday objects, including their defining features, functions, and characteristic visual attributes [15]. Although basic perceptual abilities may remain relatively intact, the ability to connect visual input with stored knowledge, such as identifying an object by sight or recalling its properties, is impaired [15]. This disruption affects both bottom-up processing of sensory information and top-down feedback mechanisms, limiting the ability to identify objects, infer their properties, and use them appropriately [15]. It also disrupts knowledge of objects and words, as demonstrated by impairments on tasks such as matching pictures based on associative or functional relationships and copying line drawings of familiar objects after a delay [16]. As a result, individuals may struggle to recognize familiar items or understand their purpose, even when they are clearly visible [15].

Red Dinnerware

The use of red and other coloured dinnerware in dementia care is grounded in the principle of visual contrast. Effective mealtime design requires that food stands out clearly against the plate, and that the plate itself is distinguishable from the table or surrounding environment [13]. Bright, solid colours with minimal patterning are considered most effective, as they reduce visual complexity and support object recognition [13]. These principles are particularly important for individuals with dementia, who often experience impaired contrast sensitivity and difficulty interpreting visual information, making it challenging to distinguish between food, dinnerware, and background surfaces [9].

Among colour-based interventions, red dinnerware has received the most attention, largely due to findings from a widely cited study conducted by Alice Cronin-Golomb and colleagues at Boston University Vision & Cognition Lab [6]. In this study individuals with AD consumed approximately 25% more food when meals were served on bright red plates compare to standard white plates [6, 17]. The researchers deliberately explored a non-pharmacological approach, focusing on how visual modifications to the environment could improve quality of life and support functional independence [6]. Subsequent work has reinforced these findings, demonstrating that high-contrast dinnerware can



lead to significant increases in both food and fluid intake, with the greatest benefits observed among individuals with the lowest baseline intake [11].

Importantly, the effectiveness of red dinnerware appears to be driven primarily by contrast rather than colour alone. Studies have shown that high-contrast interventions, regardless of specific hue, are associated with improved intake compared to low-contrast or standard white dinnerware [10]. This suggests that the key mechanism underlying improved nutritional outcomes is enhanced visual clarity, which supports recognition of food and facilitates engagement in eating. Given that visual impairments may account for up to 50% of variance in activities of daily living among older adults with cognitive impairment, improving contrast within the dining environment represents a targeted and evidence-informed strategy [10].

Beyond nutritional intake, high-contrast dinnerware has been associated with broader psychosocial and functional benefits [5]. Enhancing visual distinction between objects can reduce confusion, stress, and frustration during meals, while increasing confidence, independence, and overall safety [5, 9]. These improvements contribute not only to greater food consumption, but also to a more positive and dignified dining experience [8]. The design of assistive dinnerware has evolved in response to these findings, with products incorporating features such as high-contrast colour schemes, sloped or angled interiors, deep compartments, ergonomically curved utensils, and anti-tip bases [18]. One notable example is the Eatwell assistive tableware set, developed through a design process informed by lived experience and recognized through awards such as first place in the 2014 Stanford Design Challenge and *Time Magazine's* 20 Best Inventions of the Year [18]. These products often combine contrasting colours (i.e. blue interiors with red or yellow exteriors) to further enhance visual differentiation [18].

Despite these benefits, the adoption of assistive or coloured dinnerware is not without challenges. Aesthetic considerations and concerns around stigma may limit use, as such products can differ visually from standard dining ware and may contribute to feelings of being othered among users [7]. This highlights the importance of designing interventions that not only support function but also maintain dignity and align with preferences and identities of

individuals living with dementia. Positioning residents as active participants or “customers” in the dining experience reinforces the need for solutions that balance effectiveness with acceptability [8].

Other Colours and Contrast Interventions

Although red dinnerware has received the greatest attention in the literature, a broader body of research highlights the importance of a range of colours to optimize visual contrast in dining environments. The effectiveness of coloured tableware is highly dependent on the relationship between the food, the plate, and the surrounding surface. As such, different colours may be more or less effective depending on the specific meal being served. For example, light-coloured foods such as mashed potatoes or rice may be more easily distinguished on darker plates such as red, blue, or dark green, whereas foods like broccoli or peas may achieve greater visibility when served on lighter or contrasting surfaces such as yellow, red, or white [13]. These variations reinforce the principle that contrast, rather than any single colour is the primary determinant of effectiveness.

Commonly used colours in dementia-friendly dining include red, blue, green, and yellow, each offering distinct advantages depending on context [8, 12]. Blue tableware has been identified as particularly effective for enhancing contrast with light-coloured foods, such as grains or dairy-based items, especially when used against plain or neutral backgrounds [12]. However, its effectiveness may be reduced when paired with darker foods, where contrast is less pronounced. Yellow dinnerware, by contrast, can increase visibility on darker surfaces and is often used to enhance the appearance of foods such as vegetables [12]. At the same time, its brightness may be perceived as visually overwhelming or jarring for some individuals, highlighting the need for careful selection based on user preference and tolerance [12].

Empirical findings further support the value of combining multiple colours to enhance contrast and visual cues. In one study, a plate design

featuring a white base with a yellow rim and a red outer ring resulted in substantially higher food consumption (63.4% of participants) compared to plain white porcelain dishes (36% of participants) [8]. This suggests that layered or segmented colour contrasts may improve boundary recognition and guide attention more effectively than single-colour designs [8].

These findings underscore the importance of a flexible, context-sensitive approach to colour use in dining environments. Rather than relying on a single 'optimal' colour, effective interventions consider the interaction between food type, tableware, and environmental background to maximize contrast and visibility. Incorporating a range of colours, or combining them strategically within a single design, may further enhance object recognition, reduce visual ambiguity, and support improved engagement during meals for individuals living with dementia.

Recommendations

Based on the literature, interventions aimed at improving mealtime experiences for individuals living with dementia should prioritize visual contrast and simplicity in dining environments. High-contrast dinnerware should be used to ensure that food is clearly distinguishable from the plate, and that the plate stands out from the table or surrounding surfaces. Despite red tableware demonstrating effectiveness, the selection of colour should be guided by the type of food being served, with flexibility to incorporate other colours such as blue, green, or yellow to maximize contrast.

Further, dining environments should also be designed to reduce visual and cognitive load. This includes minimizing patterns and clutter, simplifying place settings, and ensuring adequate, consistent lighting. Combining colour with other supportive design features, such as clearly defined plate edges or segmented dishware, may further enhance recognition and independence during meals.

Finally, the design and implementation of assistive tableware should consider not only functional effectiveness but also user dignity and preference. Products that resemble standard tableware and align with familiar dining aesthetics may improve acceptance and reduce stigma. Adopting a person-

centred approach that treats residents as active participants in the dining experience can support more meaningful engagement and better nutritional outcomes.

Conclusion

Dementia-related changes in cognition, perception, and functional ability present substantial challenges to maintaining adequate nutritional intake, particularly within continuing care environments. Visual and perceptual impairments, including reduced contrast sensitivity, impaired colour discrimination, and difficulties with object recognition, are increasingly recognized as important contributors to mealtime difficulties, influencing both engagement and independence during eating.

The literature demonstrates that coloured and high-contrast dinnerware represents a promising, low-cost, non-pharmacological intervention to address these challenges. While red tableware has been most prominently studied and is frequently associated with increased food and fluid intake, the evidence indicates that contrast, rather than colour specificity, is the primary mechanism underlying observed improvements. The strategic use of colour can enhance food visibility, support object recognition, reduce confusion, and promote greater engagement with meals, particularly among individuals with more severe impairments.

Yet, the current evidence base remains limited. Much of the research is characterized by small sample sizes, short intervention periods, and variability in study design, limiting generalizability. Findings are also inconsistent across studies, suggesting that the effectiveness of colour-based interventions is highly context-dependent and influenced by factors such as food type, environmental conditions, and individual differences in cognitive and sensory function. In addition, the social and aesthetic implications of assistive tableware, particularly concerns related to stigma and user acceptance, remain underexplored.

Taken together, these findings highlight the need for more robust, real-world research to better understand how coloured dinnerware can be effectively implemented within diverse care settings. While not a standalone





solution, contrast-based environmental modifications offer a practical and evidence-informed component of a broader, person-centred approach to dining that prioritizes both nutritional outcomes and quality of life for individuals living with dementia.

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