Recognising and responding to communication and swallowing difficulties in Parkinson's disease

Sally Ireland, Vincent Carroll, Denise Blanchard, Rachel Rossiter

This article is the fourth in a series of articles on important topics in neurology.

Background
Communication difficulties, including hypokinetic dysarthria and swallowing difficulties (dysphagia), affect a large percentage of people diagnosed with Parkinson's disease. Onset of these symptoms has been identified in up to 78% of people with early-stage Parkinson's disease. Communication difficulties are frequently disregarded until they have a significant impact on quality of life, while the person may often be unaware of indicators of dysphagia and the associated risk of aspiration pneumonia.

Objective
The aim of this article is to increase awareness of the importance of identifying and addressing the communication and swallowing difficulties experienced by people living with Parkinson's disease.

Discussion
Early identification, regular review and monitoring enable the clinician to support the implementation of evidence-based, effective interventions. Collaboration with the multidisciplinary team, including speech pathology, is needed to enable the person to live well with Parkinson's disease and to prevent aspiration pneumonia, a leading cause of death in Parkinson's disease. A vignette prepared in collaboration with a person living with Parkinson's disease and his wife provides an 'insider perspective' of the pervasive impact of difficulties with communication and swallowing.

PARKINSON'S DISEASE is now understood to be a multisystem disorder.[1] Awareness of the need to assess and actively manage non-motor symptoms to improve quality of life for people living with Parkinson's disease is increasing.[2] However, awareness of the impact of neurological damage on the person's ability to communicate and swallow effectively is limited. The precise neural mechanisms of dysarthria (difficulties with speech and voice) and dysphagia (swallowing difficulties) have not been identified to date.[3] Language processing deficits specific to Parkinson's disease have been described, although the relationship with broader cognitive deficits is unclear.[4,5] Early identification of risk is important in treating dysphagia to help prevent pneumonia in people with Parkinson's disease.[6]

Communication difficulties

For almost 90% of those living with Parkinson's disease, communication difficulties have a significant impact on day-to-day functioning.[4] Early onset of speech difficulties is common, and these become increasingly debilitating as the disease progresses.[7,8] Emerging research has identified variations in voice frequency in prodromal Parkinson's disease up to five years before diagnosis.[9] Figure 1 briefly describes communication-related terminology relevant to this discussion.

Hypokinetic dysarthria is the specific dysarthria experienced by people with Parkinson's disease.[10] This speech disorder is characterised by low volume, monotone speech with poor articulation and slurred sounds. Other changes associated with hypokinetic dysarthria include breathiness and irregular pauses with rapid speech rate.[8] Notable is the misperception by the person with Parkinson's disease when speaking softly that their speaking is normal in volume. When asked to speak more loudly, the person may be able to do so for a short period;[11,12] however, maintaining a louder volume takes considerable effort and increases the frustration experienced when trying to communicate. Caregivers, family and friends may have limited awareness of the energy required to speak more loudly.[8]

People with Parkinson's disease frequently report word-finding difficulties; however, caregivers most commonly identify comprehension difficulties as having a greater impact on everyday communication than word-finding difficulties do. While language difficulties increase with cognitive decline, 30–40% of people with Parkinson's disease without significant cognitive deficits have unique linguistic difficulties, such as difficulties with comprehension, word finding and verbal fluency.[5,13]

A further contributor to communication difficulties is the marked reduction in facial expression (hypomimia) or amimia (absence of facial expression). As an early symptom of Parkinson's disease, this is often misinterpreted as aloofness, lack of interest or indicative of depression. This also increases social isolation.[6] Recent research suggests that amimia is a 'potential predictor of global Parkinson's disease severity, including axial symptoms and cognitive decline'.[14]

All these factors, in conjunction with cognitive challenges such as distractibility, difficulty formulating ideas and reduced attention span, adversely affect the person's ability to engage in social interactions. These communication difficulties markedly affect the quality of life of the person living with Parkinson's disease and that of their caregiver.[5,15]

Swallowing difficulties

Over 80% of patients with Parkinson's disease will develop dysphagia involving the different phases of swallowing: oral preparatory and transportation, pharyngeal or oesophageal (Table 1).[16,17] While dysphagia is frequent, it is underdiagnosed because of initial compensatory behaviours, poor self-awareness and limited use of screening tools.[17] Compensatory behaviours include reducing bolus size, changing food consistency and excluding foods that cause difficulty when eating.[12] Although both mild and severe oesophageal dysfunction has been widely reported in Parkinson's disease, a clear association with oropharyngeal dysphagia has not been identified.[18] However, oesophageal dysfunction is outside the scope of this discussion.

Oropharyngeal dysphagia affects the person's quality of life and socialisation and has been shown to contribute to malnutrition and dehydration,[19] with poor nutritional status adversely affecting the person's capacity to undertake activities of daily living.[20] The person's ability to take oral medication safely is also impaired,[16] with tablets remaining in the oral cavity or lodging in the pharynx.[21] Oropharyngeal dysphagia markedly increases the risk of aspiration pneumonia, identified as the leading cause of death in Parkinson's disease.[22]

Sialorrhea (drooling) is often associated with dysphagia. Drooling has been reported in 37% of people with Parkinson's disease, with the highest rates in those over 80 years of age.[23] Hypomimia, resulting in 'reduced lip seal', may also contribute to drooling. This symptom increases the risk of dry mouth and dehydration, increases speech difficulties and contributes to social isolation because of embarrassment.[23]

Early identification of dysphagia is advised to enable management of the serious negative consequences of oropharyngeal dysphagia and decrease mortality.[17] A multinational consensus on dysphagia in Parkinson's disease recommends seeking signs and symptoms at diagnosis, with re-evaluation preferably every year (Table 2).[24] Severe dysphagia in late-stage Parkinson's disease predicts a rapidly worsening outcome and requires active management.[25]

Impact of communication and swallowing difficulties on quality of life

For the person living with Parkinson's disease, impaired communication and dysphagia contribute to widely reported decreased self-confidence, increased self-consciousness and social anxiety.[4,26] Lack of understanding of the person's condition results in reports that 'people talk over them, talked for them, did not wait for an answer, ignored them, assumed they were stupid'.[4] Self-stigma, where the

Voice Describes the production of sound (ie the vibration of the vocal folds) Cranial nerves X and XI	• **Dysarthria** • Impairment can result in changes in voice quality, difficulty with adjusting volume or a sense of vocal fatigue; it is also closely associated with breath control abilities
Speech Describes the movements of the jaw, lips, tongue and soft palate to form speech sounds Cranial nerves V, VII, X and XII	• **Dysarthria** • Impairment can result in poor control of these muscles, leading to imprecise articulation of sounds or slurred speech
Facial expression Describes the complex interplay of voluntary and involuntary movements that have a central role in nonverbal communication Cranial nerve VII	• **Hypomimia –** marked reduction in facial expression • **Amimia –** absence of facial expression
Language Describes the cortical functions of word finding, sentence formulation, understanding, connecting ideas fluently, using communication appropriately in social contexts	• **Aphasia** • Difficulties affect ability to communicate daily wants and needs • Affects ability to engage in more wide-reaching or multiperson conversations

Figure 1. Communication-related terminology

person with Parkinson's feels embarrassed and fears the reactions of other people, also contributes to withdrawal, increasing social isolation and depression.[27] Difficulties in engaging in meaningful communication with family, friends and work colleagues combined with the impact of dysphagia, drooling and fear of choking leads to a reluctance to engage in social interactions.[24] Caregivers experience increasing difficulties as they take on more communication-related activities for the person with Parkinson's disease while also struggling to communicate effectively.[28]

Interventions for communication and swallowing difficulties

Early referral for speech pathology is recommended even if there are no overt communication symptoms. To date, pharmacological and surgical interventions have not demonstrated consistent beneficial outcomes for communication difficulties. A growing evidence base demonstrates improvements in speech production and beneficial effects in reducing symptoms of hypokinetic dysarthria with speech pathologist–delivered behavioural approaches (Table 3).[8,29,30] Programs such as the Lee Silverman Voice Treatment (LSVT) LOUD or SPEAK OUT are available from trained speech pathologists in Australia. Speech pathologists are also trained in assisting with aphasia and cognitive-related communication difficulties. Emerging findings also suggest that participation in therapeutic group singing for people with Parkinson's disease affects social interaction positively and may improve vocal function and respiratory pressure.[31,32]

Early referral to a speech pathologist for those with a positive swallowing screening test is likewise important to identify and reduce the risks of aspiration, choking, dysphagia-related malnutrition and dehydration. Following clinical assessment, the speech pathologist may request a referral for further assessment to determine the safest textures/consistencies for oral intake. Video fluoroscopic swallowing studies and fibreoptic endoscopic evaluation of swallowing are recommended as first-line diagnostic tools if available.[3,24] These may be accessible via major urban hospitals with speech pathology outpatient services.

Access to specialist speech pathologist services is variable,[33] especially for those living in remote and rural regions in Australia. Speech Pathology Australia – Find a Speech Pathologist (www.speechpathologyaustralia.org.au) can be used to identify the closest public and private services. Advances in

Table 1. Prevalence of dysphagia

Study	Type	Findings
Kalf et al[37]	Meta-analysis	• Subjective dysphagia in one-third of community-dwelling patients • Objectively measurements indicated that 80% of patients with Parkinson's disease were affected
Pflug et al[38]	Prospective cohort study (n = 119)	• Common at all stages of disease • Only 5% had unremarkable deglutition • Aspiration in 20% with disease duration <2 years • Of the participants, 73% denied difficulty swallowing or problems with choking (16% of these had critical aspiration)
López-Liria et al[6]	Systematic review	• In the early stages of Parkinson's disease, 80% of patients had dysphagia • This rose to 95% dysphagia in the advanced stages of Parkinson's disease

Table 2. Screening for dysphagia: When should dysphagia be suspected in people with Parkinson's disease?[24]

Evidence of one or more of these	• Increased eating time (meal duration) • Post-swallowing coughing • Post-swallowing gurgling voice • Drooling • Choking • Breathing disturbance • Unintentional weight loss • Difficulty swallowing medication • Sensations of food retention • One or more episodes of pneumonia
Yes, to one or both questions	• Have you experienced any difficulty in swallowing food or drink? • Have you ever felt as if you are choking on your food?
Initial screening	
Self-report questionnaire	Swallowing disturbance questionnaire (Appendix 1, available online only)[39]
Thorough medical history	
Recommend	Obtain collaborative history from care giver/partner as compensatory behaviours may reduce awareness of swallowing difficulties[12]

technology-enabled care increasingly support home-based multidisciplinary care.[34] Telerehabilitation offers the possibility of communication and swallowing assessment and interventions for people with Parkinson's disease[35] and is endorsed by Speech Pathology Australia.

Referral to a dietitian is also recommended to help ensure adequate nutrition for those with swallowing difficulties.[36] Major hospitals and community health centres may offer the required services; alternatively, Dietitians Australia – Find a dietitian (https://member.dietitiansaustralia.org.au/faapd) can be used to find the closest dietitian services.

Vignette as told by Trevor and Pat

Trevor (age 70 years) and Pat (age 69 years) enjoyed three years of retirement travelling around Australia, camping and bushwalking. Trevor then noticed a change in his gait, and his sense of smell and taste began to disappear. Eating deteriorated; he recalls:

> *I would only be halfway through my meal and everyone is finished and waiting … My speech was bad, my voice was soft, and I mumbled a lot.*

Initially diagnosed with Parkinson's disease, symptoms continued to deteriorate. A second opinion identified Parkinsonism and normal pressure hydrocephalus. Insertion of a shunt dramatically relieved symptoms for six months, and Parkinson's disease was almost excluded. Symptoms again worsened, and diagnosis remains Parkinson's disease with normal pressure hydrocephalus, though this is challenging because of ongoing fluctuations in symptoms, decline in condition and lack of response to levodopa.

> *I talk a lot softer and lose my breath while I am talking. If I don't concentrate on taking a breath while I am talking, it just fades into nothing … especially if I get excited about something.*

When Trevor is with his friends with Parkinson's disease:

> *It's hard when someone goes wrwrwrwrwr … you can't understand them … it's so hard … we are the ones doing it and we think we are not. I think I'm speaking clearly and loudly … until it is played back.*

For Trevor, taking tablets is 'the worst thing':

> *I don't cough or choke, I have to get the tablet placed correctly in my mouth, on my tongue for the initial swallowing action. If you don't concentrate on where it is in your mouth, you can't swallow it.*

Trevor drools at times, while at night, his mouth is dry. Sucking a lolly helps. Eating is challenging:

> *I eat mince and things that are softer and more palatable.*

> *When you go out … you worry … people are watching you, I lean over … because I could drop food or can't chew it and have to spit it out … it's demoralising when you've got to do things like that.*

The speech pathologist assessed swallowing and talking and gave Trevor speech exercises:

> *The more I say them the better I get … when I don't do them for a while … by midday I'm just not understandable … my poor short-term memory doesn't help though, sometimes when I talk, I forget what I'm talking about, so I only get halfway through what I'm saying.*

Trevor also uses an app designed for Parkinson's speech.

Over the past year, Trevor's mobility has deteriorated, resulting in multiple fractures and admissions to hospital. He falls at least once a day. Both Trevor and Pat now require hearing aids. Pat says:

> *Day to day, the biggest problem we have is his voice … I constantly struggle to either hear him or understand him … I can hear him at other places talking to other people and it's fine … he just seems to think he doesn't have to try as hard, this is just Pat, um so yeah, a bit of frustration, not so much friction. His falls worry me but it's something that you can probably get on top of, I hope.*

Table 3. Evidence for speech pathology interventions

Study	Type	Findings
Levy et al[40]	RCT	Intensive speech treatment targeting voice improves speech intelligibility.
López-Liria et al[6]	Systematic review	Expiratory Muscle Strength Training shown to be successful in improving swallowing and oropharyngeal function and reducing the risk of choking and/or aspiration. Other interventions, including swallow manoeuvring, postural treatment and compensation strategies, require well-designed RCTs with larger populations.
Muñoz-Vigueras et al[29]	Systematic review and meta-analysis of RCTs	Speech language therapy for reducing hypokinetic dysarthria improves perceptual intelligibility, sound pressure level and semitone standard deviation.
Miles[30]	Pilot	LSVT LOUD demonstrates additional spread effects on pharyngoesophageal deglutitive function and involuntary cough effectiveness.

LSVT, Lee Silverman Voice Treatment; RCT, randomised controlled trial

Conclusion

Speech, language and swallowing difficulties are everyday occurrences at all stages of Parkinson's disease. As a result of the complex neural mechanisms involved, medications that help with motor symptoms are not often effective for

these difficulties. Early identification and referral for behavioural interventions by a speech pathologist and dietitian support for swallowing difficulties have been shown to be effective in helping those who live with Parkinson's disease, improving their quality of life and reducing the risk of premature death due to aspiration. The general practitioner plays a key part in identifying these difficulties and initiating a multidisciplinary team approach to care.

Key points

- Communication and swallowing difficulties adversely affect the quality of life and social engagement of and increase morbidity in people with Parkinson's disease.
- Limited self-awareness of swallowing and communication difficulties can delay early intervention.
- Early referral to a speech pathologist with specialist skills in assessment and therapeutic interventions for Parkinson's disease is recommended.
- Active engagement in speech pathologist–led Parkinson's disease–focused therapeutic interventions has been demonstrated to improve both communication and swallowing problems.
- Referral to a dietitian to assist in ensuring adequate nutrition for the person with swallowing difficulties is required.

Authors

Sally Ireland BAppliedSci (Speech Pathology), Certified Practising Speech Pathologist, Private Practice, Valla Beach, NSW

Vincent Carroll RN, GradDipBA, BHealthSci (Nursing), MSci (Dementia Care), Parkinson's Clinical Nurse Consultant, Mid North Coast Local Health District, NSW Health, Port Macquarie, NSW; School of Nursing, Paramedicine and Healthcare Sciences, Faculty of Science and Health, Charles Sturt University, Orange, NSW; Parkinson's NSW

Denise Blanchard RN, PhD, Associate Professor, School of Nursing, Faculty of Education, Humanities and Health Science, Eastern Institute of Technology Hawkes Bay, NZ; School of Nursing, Paramedicine and Healthcare Sciences, Faculty of Science and Health, Charles Sturt University, NSW; School of Nursing and Midwifery, Faculty of Health and Medicine, the University of Newcastle, NSW

Rachel Rossiter RN, MNursing (Nurse Practitioner), Doctor of Health Science, Associate Professor of Nursing, Charles Sturt University, School of Nursing, Paramedicine and Healthcare Sciences, Faculty of Science and Health, Orange, NSW; Parkinson's NSW

Competing interests: None.

Funding: None.

Provenance and peer review: Commissioned, externally peer reviewed.

Correspondence to:
sally.irelandsp@gmail.com

Acknowledgements

The authors would like to thank Trevor and Patricia Lyons for sharing their lived experience of Parkinson's disease.

References

1. Klingelhoefer L, Reichmann H. Parkinson's disease as a multisystem disorder. J Neural Transm 2017;124(6):709–13. doi: 10.1007/s00702-017-1692-0.
2. Schapira AHV, Chaudhuri KR, Jenner P. Non-motor features of Parkinson disease. Nat Rev Neurosci 2017;18(7):35–450. doi: 10.1038/nrn.2017.62.
3. Broadfoot CK, Abur D, Hoffmeister JD, Stepp CE, Ciucci MR. Research-based updates in swallowing and communication dysfunction in Parkinson disease: Implications for evaluation and management. Perspect ASHA Spec Interest Groups 2019;4(5):825–41. doi: 10.1044/2019_persp-sig3-2019-0001.
4. Miller N. Communication changes in Parkinson's disease. Pract Neurol 2017;17(4):266–74. doi: 10.1136/practneurol-2017-001635.
5. Wolff L, Benge J. Everyday language difficulties in Parkinson's disease: Caregiver description and relationship with cognition, activities of daily living, and motor disability. Am J Speech Lang Pathol 2019;28(1):165–73. doi: 10.1044/2018_AJSLP-18-0091.
6. López-Liria R, Parra-Egeda J, Vega-Ramírez FA, et al. Treatment of dysphagia in Parkinson's disease: A systematic review. Int J Environ Res Public Health 2020;17(11):4104. doi: 10.3390/ijerph17114104.
7. Ciucci MR, Grant LM, Rajamanickam ES, et al. Early identification and treatment of communication and swallowing deficits in Parkinson disease. Semin Speech Lang 2013;34(3):185–02. doi: 10.1055/s-0033-1358367.
8. Moya-Galé G, Levy ES. Parkinson's disease-associated dysarthria: Prevalence, impact and management strategies. Res Rev Parkinsonism 2019;9:9–16.
9. Simonet C, Schrag A, Lees AJ, Noyce AJ. The motor prodromes of Parkinson's disease: From bedside observation to large-scale application. J Neurol 2021;268(6):2099–108. doi: 10.1007/s00415-019-09642-0.
10. Olanow CW, Stocchi F, Lang A, Stocchi F. Parkinson's disease: Non-motor and non-dopaminergic features. Hoboken, NJ: Wiley-Blackwell, 2011.
11. Friedman JH. Misperceptions and Parkinson's disease. J Neurol Sci 2017;374:42–46. doi: 10.1016/j.jns.2016.12.059.
12. Silbergleit AK, Schultz L, Hamilton K, LeWitt PA, Sidiropoulos C. Self-perception of voice and swallowing handicap in Parkinson's disease. J Parkinsons Dis 2021;11(4):2027–34. doi: 10.3233/JPD-212621.
13. Cardona JF, Grisales-Cardenas JS, Trujillo-Llano C, et al. Semantic memory and lexical availability in Parkinson's disease: A statistical learning study. Front Aging Neurosci 2021;13:697065. doi: 10.3389/fnagi.2021.697065.
14. Maycas-Cepeda T, López-Ruiz P, Feliz-Feliz C, et al. Hypomimia in Parkinson's Disease: What is it telling us? Front Neurol 2021;11:603582. doi: 10.3389/fneur.2020.603582.
15. Liu Y, Gui Y, Hu J, et al. Attention/memory complaint is correlated with motor speech disorder in Parkinson's disease. BMC Neurol 2019;19(1):309. doi: 10.1186/s12883-019-1535-8.
16. Suttrup I, Warnecke T. Dysphagia in Parkinson's disease. Dysphagia 2016;31(1):24–32. doi: 10.1007/s00455-015-9671-9.
17. Kwon M, Lee JH. Oro-pharyngeal dysphagia in Parkinson's disease and related movement disorders. J Mov Disord 2019;12(3):152–60. doi: 10.14802/jmd.19048.
18. Suttrup I, Suttrup J, Suntrup-Krueger S, et al. Esophageal dysfunction in different stages of Parkinson's disease. Neurogastroenterol Motil 2017;29(1). doi: 10.1111/nmo.12915.
19. Ma K, Xiong N, Shen Y, et al. Weight loss and malnutrition in patients with Parkinson's disease: Current knowledge and future prospects. Front Aging Neurosci 2018;10:1. doi: 10.3389/fnagi.2018.00001.
20. Nagano T, Kakuma T, Umezu Y, Yanagawa T. Nutritional status and activities of daily living in patients with Parkinson's disease. PLoS One 2021;16(2):e0246329. doi: 10.1371/journal.pone.0246329.
21. Buhmann C, Bihler M, Emich K, et al. Pill swallowing in Parkinson's disease: A prospective study based on flexible endoscopic evaluation of swallowing. Parkinsonism Relat Disord 2019;62:51–56. doi: 10.1016/j.parkreldis.2019.02.002.
22. Patel B, Legacy J, Hegland KW, Okun MS, Herndon NE. A comprehensive review of the diagnosis and treatment of Parkinson's disease dysphagia and aspiration. Expert Rev Gastroenterol Hepatol 2020;14(6):411–24. doi: 10.1080/17474124.2020.1769475.
23. van Wamelen DJ, Leta V, Johnson J, Ocampo CL, et al. Drooling in Parkinson's disease: Prevalence and progression from the Non-motor International Longitudinal Study. Dysphagia 2020;35(6):955–61. doi: 10.1007/s00455-020-10102-5.
24. Cosentino G, Avenali M, Schindler A, et al. A multinational consensus on dysphagia in Parkinson's disease: Screening, diagnosis and prognostic value. J Neurol 2021. doi: 10.1007/s00415-021-10739-8. Epub ahead of print.
25. Fabbri M, Coelho M, Abreu D, et al. Dysphagia predicts poor outcome in late-stage Parkinson's disease. Parkinsonism Relat Disord 2019;64:73–81. doi: 10.1016/j.parkreldis.2019.02.043.
26. Soundy A, Stubbs B, Roskell C. The experience of Parkinson's disease: A systematic review and meta-ethnography. ScientificWorldJournal 2014;2014:613592. doi: 10.1155/2014/613592.
27. Leece P, Khorasheh T, Paul N, et al. 'Communities are attempting to tackle the crisis': A scoping review on community plans to prevent and reduce opioid-related harms. BMJ Open 2019;9(9):e028583. doi: 10.1136/bmjopen-2018-028583.
28. Mach H, Baylor C, Hunting Pompon R, Yorkston K. Third-party disability in family members of people with communication disorders associated with Parkinson's disease. Top Lang Disord 2019;39(1):71–88.
29. Muñoz-Vigueras N, Prados-Román E, Valenza MC, et al. Speech and language therapy treatment on hypokinetic dysarthria in Parkinson disease: Systematic review and meta-analysis. Clin Rehabil 2021;35(5):639–55. doi: 10.1177/0269215520976267.

30. Miles A, Jardine M, Johnston F, de Lisle M, Friary P, Allen J. Effect of Lee Silverman Voice Treatment (LSVT LOUD®) on swallowing and cough in Parkinson's disease: A pilot study. J Neurol Sci 2017;383:180–87. doi: 10.1016/j.jns.2017.11.015.
31. Stegemöller EL, Hurt TR, O'Connor MC, et al. Experiences of persons with Parkinson's disease engaged in group therapeutic singing. J Music Ther 2018;54(4):405–31. doi: 10.1093/jmt/thx012.
32. Stegemöller EL, Radig H, Hibbing P, Wingate J, Sapienza C. Effects of singing on voice, respiratory control and quality of life in persons with Parkinson's disease. Disabil Rehabil 2017;39(6):594–600. doi: 10.3109/09638288.2016.1152610.
33. Swales M, Theodoros D, Hill AJ, Russell T. Communication service provision and access for people with Parkinson's disease in Australia: A national survey of speech-language pathologists. Int J Speech Lang Pathol 2019;21(6):572–83. doi: 10.1080/17549507.2018.1537372.
34. Luis-Martínez R, Monje MHG, Antonini A, et al. Technology-enabled care: Integrating multidisciplinary care in Parkinson's disease through digital technology. Front Neurol 2020;11:575975. doi: 10.3389/fneur.2020.575975.
35. Theodoros D. Telerehabilitation for communication and swallowing disorders in Parkinson's disease. J Parkinsons Dis 2021;11(s1):S65–70. doi: 10.3233/JPD-202414.
36. Baert F, Matthys C, Mellaerts R, Lemaître D, Vlaemynck G, Foulon V. Dietary intake of Parkinson's disease patients. Front Nutr 2020;7:105. doi: 10.3389/fnut.2020.00105.
37. Kalf JG, de Swart BJ, Bloem BR, Munneke M. Prevalence of oropharyngeal dysphagia in Parkinson's disease: A meta-analysis. Parkinsonism Relat Disord 2012;18(4):311–15. doi: 10.1016/j.parkreldis.2011.11.006.
38. Pflug C, Bihler M, Emich K, et al. Critical dysphagia is common in Parkinson's disease and occurs even in early stages: A prospective cohort study. Dysphagia 2018;33(1):41–50. doi: 10.1007/s00455-017-9831-1.
39. Manor Y, Giladi N, Cohen A, Fliss DM, Cohen JT. Validation of a swallowing disturbance questionnaire for detecting dysphagia in patients with Parkinson's disease. Mov Disord 2007;22(13):1917–21. doi: 10.1002/mds.21625.
40. Levy ES, Moya-Galé G, Chang YHM, et al. The effects of intensive speech treatment on intelligibility in Parkinson's disease: A randomised controlled trial. EClinicalMedicine 2020;24:100429. doi: 10.1016/j.eclinm.2020.100429.

correspondence **ajgp@racgp.org.au**