

Danielle Sims\* 

## A Detailed Summary of Speech Pathology Assessment and Intervention of A Minimally Verbal Australian Child with Autism Spectrum Disorder

Szczegółowe podsumowanie oceny zaburzeń mowy i terapii logopedycznej prawie niemówiącego australijskiego dziecka z zaburzeniami ze spektrum autyzmu

**Keywords:** autism spectrum disorder (ASD), complex communication needs, minimally verbal, speech and language pathology, treatment approaches, Naturalistic Developmental Behavioural Interventions (NDBIs), family centred practice

**Słowa kluczowe:** zaburzenie ze spektrum autyzmu (ASD), złożone potrzeby komunikacyjne, prawie niemówiący, patologia mowy, podejścia do leczenia, naturalistyczne interwencje rozwojowo-behawioralne (NDBI), praktyka skoncentrowana na rodzinie

### Theoretical and research basis for treatment

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder primarily characterised by social communication deficits and restricted and repetitive behaviours [American Psychiatric Association, 2013]. Recent prevalence data suggests that approximately 1 in 59 people meet the criteria for ASD [Baio et al., 2018]. The DSM-5™ proposes that males are four-times more likely to receive a diagnosis of ASD than females, however, a recent meta-analysis and systematic review proposes that this ratio is closer to three-to-one [American Psychiatric Association, 2013; Baio et al., 2018]. Whilst language difficulties were removed from the DSM as a core feature of ASD [American Psychiatric Association, 2013], many children with ASD have a high degree of difficulty developing functional spoken language [Paul et al., 2013]

\* Rockingham Autism Services, 3/3 Benjamin Way, Rockingham WA 6168, e-mail: [danielle@rockinghamautismservices.com.au](mailto:danielle@rockinghamautismservices.com.au), ORCID: <https://orcid.org/0000-0002-8518-2223>.

and it is estimated that between 25% and 30% of children with ASD do not acquire functional verbal speech or remain minimally verbal [Tager-Flusberg, Kasari, 2013; Pickles, Anderson, Lord, 2014; Bal et al., 2016]. Additionally, research suggests that these language difficulties may lead to further adverse outcomes, including poorer adaptive functioning skills, the development of oppositional and anti-social behaviours and a reduced quality of life [Bott, Farmer, Rohde, 1997; Frost, Hong, Lord, 2017; Howlin, Magiati, 2017; Moss, Mandy, Howlin, 2017]. This can result in a decreased ability for these individuals to participate in activities of daily living, contributing to a poorer overall quality of life and higher rates of caregiver stress [Huang et al., 2013; Iadarola et al., 2019]. Although ASD typically causes lifelong impairments in the areas of socialisation and communication, research has shown that the implementation of intensive interdisciplinary interventions can improve intellectual and communicative functioning in individuals with ASD, particularly when intervention is delivered in the early years of life [Vismara, Rogers, 2008; Rieske, 2019; Sandbank et al., 2020].

Speech and language pathologists (SLPs) have an important role to play in the identification and interdisciplinary treatment of ASD [Diehl, 2003; Drager, Light, McNaughton, 2010; Self, Coufal, Parham, 2010]. In addition to providing knowledge about the development of speech and language skills, SLPs have a comprehensive understanding of pragmatic language skills, a core deficit of individuals with ASD [Self, Coufal, Parham, 2010; Rieske, 2019]. SLPs may also prescribe alternative means of communicating, including through the use of augmentative and alternative communication (AAC) systems, which are shown to be particularly beneficial for individuals with complex communication needs [Drager, Light, McNaughton, 2010; Ganz et al., 2012; Ganz 2015]. Whilst speech and language intervention is an integral part of the treatment of individuals with ASD, there remains a large degree of variation in the treatment approaches and programs that are utilised within clinical practice [Brignell et al., 2018].

There are several well-researched treatment approaches that aim to address the core underlying deficits within ASD. These include behavioural approaches, developmental approaches and Naturalistic Developmental Behavioural Interventions (NDBIs), among others [Sandbank et al., 2020]. A number of treatment programs that are underpinned by these approaches have been developed to provide clinicians with specific instruction when delivering interventions to clients [Sandbank et al., 2020]. Some of these programs include PECS, Discreet Trial Training (DTT) and Milieu Communication Training (MCT), which follow a behavioural approach; Hanen models and DIR/Floortime, as developmental approaches; and JASPER, PACT and the Early Start Denver Model, as NDBIs. A recent meta-analysis conducted by Sandbank et. al [2020] found that NDBIs have the greatest level of evidence supported by RCTs. These treatment programs were found to support the development of social communication, play skills and language in individuals with ASD [Sandbank et al., 2020].

With the large variation of clinical presentations of individuals on the autism spectrum [Tager-Flusberg, Kasari, 2013; Rieske, 2019] and an ever-growing need for holistic, client-centred treatment approaches following the International Classification of Functioning – Children and Youth (ICF-CY) Framework [World Health Organization, 2007], clinicians are often required to select and utilise several different intervention programs to meet the needs of each individual and their families. Clinicians are faced with a number of challenges when it comes to selecting the most appropriate therapeutic intervention for their patients [Kasari et al., 2013]. One of these challenges is the scarcity of valid, well-researched assessment tools, particularly for minimally verbal individuals with ASD [Kasari et al., 2013; Plesa Skwerer et al., 2016]. Standardised assessment protocols are often not appropriate for use with minimally verbal individuals on the autism spectrum, who may not perform well under standardised testing conditions [Kasari et al., 2013]. Kasari et al. [2013] recommend utilising a combination of standardised and experimental measures to assess the individual's medical history, speech sound production, language skills, social behaviours, repetitive behaviours/restricted interests, nonverbal cognitive ability, and their imitation, intentional communication and play abilities. Research has indicated that involving parents in the assessment, goal selection and intervention process leads to improved outcomes and generalisation of skills [Aldred, Green, Adams, 2004; McKean, Phillips, Thompson, 2012]. Therefore, it is important that clinicians take into account family priorities and their capacity to access and utilise services.

The following single case study aims to describe the speech and language assessment and intervention of a minimally verbal seven-year-old boy with a diagnosis of autism spectrum disorder.

## Practical application of therapeutic treatments with a minimally verbal child with ASD – a case study

### Birth and developmental history

The boy (referred to as JC for the purposes of this study) was born in 2012 and is presently 7 years old. He is the only child of multilingual Polish-speaking parents, and currently attends school in an education support unit in Australia. JC's family report that English is the primary spoken language in the home environment, and makes up approximately 75% dialogue, with the remaining 25% being spoken in Polish. There is no significant family history of ASD reported. JC was born at 39 weeks' gestation following a healthy pregnancy, and there were nil concerns regarding the acquisition of early developmental milestones. JC was reportedly smiling by 6 weeks, crawling by 9 months and walking by 12 months. He had developed some single words by 2 years and was reportedly combining up to 3 words to create

simple sentences (i.e. “daddy look truck”). At approximately 2.5 years age, JC’s parents noted a change in his behaviour, including an increase in aggression, the development of repetitive behaviours and a regression of language skills. At 2 years, 8 months, JC was referred to be assessed for autism spectrum disorder by a senior social worker following concerns about his overall delays. At 3 years old, he was formally assessed using the Autism Diagnostic Observation Schedule-2 (ADOS-2), which was administered in English, where JC was found to meet the requirements of level 3 deficits in social communication, and level 2 deficits in restricted-repetitive behaviours as outlined in the DSM-5<sup>TM</sup>.

## Assessments

JC has been receiving consistent 1.5 hour weekly speech pathology intervention for the past two years. After being referred to receive therapy services in 2017, at age 5, JC’s family were interviewed by the SLP to gain insights into his developmental history, family priorities and current levels of functioning. The interview included questions pertaining to family dynamics; JC’s developmental, medical and social history; previous intervention and its effectiveness; JC’s strengths, motivators and interests; and specific family goals and concerns related to self-care, mobility, communication, socialisation, learning and self-management. JC’s ASD diagnostic report was forwarded to the SLP for review and was used to gather additional information relating to these areas. JC was then observed within both a clinical and home setting, where he had access to a range of toys, for informal observation of his natural play skills, the presence of repetitive behaviours and restricted interests (RBRI), language production, oral motor skills (focusing on the presence of speech sound errors) and social communication preferences. JC’s parents also completed the Vineland Adaptive Behaviour Scales – Third Addition, to assess his communication skills, socialisation, daily living skills and motor development.

These clinical observations and parent reports indicated that, at the time of assessment, JC had a limited verbal repertoire, consisting of four words, “bubble”, “mum”, “dad” and “no”. Two of these were produced as approximates, with some speech sound errors (“Mummu” [mʌmʊ], “Daddu” [dædʊ] for “mum” and “dad”). JC’s speech was highly echolalic, which allowed the speech pathologist to assess his phonology within some single word utterances. He presented with a range of delayed phonological error processes including stopping, fronting, cluster reduction, reduplication and weak syllable deletion. Errors were inconsistent across trials and JC had difficulty producing multisyllabic words, suggesting the possible presence of motor planning deficits (such as in Childhood Apraxia of Speech). All oral motor structures were observed to be intact with nil signs of physical weakness. JC was independently ambulant, and was able to complete most gross motor tasks without support.

JC presented with severely limited play skills, earning a v-scale score of 5 in the Vineland-3 for play and leisure. His movements and actions with objects were highly

stereotyped and predominated by the repetitive tapping of objects onto surfaces. JC required support from his parents within some activities of daily living, including dressing, cutlery use, showering and toileting. JC's preferred mode of communication was leading others to a desired item and pointing to or reaching for the item. In the event that JC was not able to access a desired item or communicate his wants, needs or feelings effectively, he had the propensity to become physically or verbally aggressive by pushing, hitting or biting others; or by shouting, yelling, or crying "no". JC's parents were well engaged with therapy services, however had some degree of difficulty communicating with the assessing SLP, as English is their non-dominant language. JC's family priorities at the time of assessment were to improve his communication skills and reduce the frequency and intensity of his RBRI's. Specifically, JC's family wished to improve his verbal communication to include single-word requests, to improve his play skills to replace RBRI's and to improve his social engagement with peers.

### Detailed description of treatments

Following these assessments, the SLP developed a therapy program that aimed to target specific areas of deficit and focused on developing skills that were flagged as priorities for the family. Therapy was conducted within the home environment with JC's mother present, and utilised, where possible, objects within the home that JC would have ongoing access to, in an attempt to encourage generalisation of skills learned during therapy. Within sessions, activities were modelled to JC's mother, and she was encouraged to join in, allowing the SLP to observe interactions and provide feedback. A combined treatment approach was employed within the program, combining theories of Applied Behavioural Analysis (ABA) and Hanen to suit the needs of the family. Additional treatment protocols were also utilised to target specific areas of deficit, such as the Nuffield Dyspraxia Program, to improve JC's phonology; and core language interventions to promote functional AAC use. The theories underpinning ABA, including the consistent use of highly structured tasks, motivators and token charts to shape pro-social behaviours and teach concepts were employed within the majority of therapy activities.

## Play skills

### Theoretical rationale

Play skills represent an integral part of developing pre-language skills, improving comprehension and reducing the frequency and intensity of RBRI's [Jung, Sainato, 2013], which was identified as a priority for JC's family. The play skills of individuals with ASD are often skewed by the presence of RBRI's [Blanc et al., 2005; Holmes, Willoughby,

2005]. The development of play skills allows for the facilitation of social and communicative interactions with peers, and hence it is targeted to provide a scaffold for the development of early social skills [Jung, Sainato, 2013]. Theories of incidental teaching, specifically following the child's lead and using items within JC's home environment, were utilised within therapy to improve the likelihood of generalisation of skills [Warren, Kaiser, 1986]. Imitation, a critical skill in the development of cognitive and social skills, was utilised by the therapist to target the development of JC's play skills and other therapy goals. Play-based tasks involved family members, which allowed the therapist to provide ongoing modelling and feedback to JC's caregivers.

### Initial measures

Upon initial assessment, JC presented with poor imitation skills as well as reduced functional play skills (understanding of common actions with objects). Initial measures found that JC was able to imitate actions with common objects (stirring a spoon, pushing a car and feeding a puppet) at 50% accuracy with gestural and verbal clinician prompting.

### Treatment approaches

For JC, early play skills focused on the development of causal relationships with objects, and included a strong focus on developing play skills through imitation. Where possible, the SLP followed JC's lead to shape appropriate play skills with items that JC showed an interest in. Play skills were presented in a scaffolded and highly predictable manner, and focused on the use of a token chart and tangible motivators. The initial motivators included access to desired items, paired with social praise following completion of the task (following the theories of ABA). As the number of trials increased, access to tangible motivators was slowly phased down, with social praise remaining the core motivating factor for completion of therapy tasks. The purpose of reducing external motivators was to increase intrinsic motivation and shape prosocialisation. Play skills were modelled with cause-and-effect toys (such as push-button plush toys, wind up cars and sound effect books/toys). Later play skills included basic turn taking (e.g. rolling a ball between the SLP and JC) and imitation of actions-with-objects (e.g. pushing a car, stacking blocks, drinking from a cup). For each trial, the SLP provided JC with an initial physical model of the target play skill, before handing him the object and giving him a verbal prompt "show me" or "your turn". Play skills were assessed quantitatively in terms of the number of trials imitated successfully (and at what level of prompting).

### Outcome measures

Data from JC's most recent therapy sessions indicate that JC has mastered and surpassed the imitation of functional play, and has progressed to social play routines. Within sessions, JC frequently initiates social play (hide and seek and chasey), and

is able to take turns with one other person within structured cause-and-effect games at 80% accuracy with gestural and verbal prompting. JC's family have reported moderate decreases in the frequency and intensity of JC's RBRIs.

## Receptive language and relational frame theory

### Theoretical rationale

Language deficits are widely reported within individuals with ASD [Paul et al., 2013]. Receptive language is considered to be a foundational skill for the development of expressive language, and is related to the functional comprehension of verbal instructions [Bloom, 1974]. Relational Frame Theory (RFT) proposes that language and thinking result from an ability to create links between stimuli [Murphy, Barnes-Holmes, Barnes-Holmes, 2005]. Research indicates that children with autism often possess deficits in their ability to create links between language (verbal and non-verbal) and experiences [Sundberg, Michael, 2001; Murphy, Barnes-Holmes, Barnes-Holmes, 2005]. For example, a child may be able to request (mand) an item, but may have difficulty with labelling (tact) the same item. Research suggests that RFT can be embedded within therapy to improve language skills and the development of theory of mind in individuals with ASD [Sundberg, Michael, 2001; Barnes-Holmes, McHugh, Barnes-Holmes, 2004].

### Initial measures

At the onset of therapy, JC was able to identify real-life pictures of common language targets (animals, colours, shapes) out of a field of view of two at 50% accuracy. He was able to follow functional one-step instructions (open the door) when the instruction was paired a gestural prompt at 60% accuracy. He was able to match 3D objects to each other at 20% accuracy.

### Treatment approaches

Early receptive language targets included body parts, household items, animals, colours and shapes. Receptive language targets were presented visually; initially as real life pictures and then as symbolic representations. Language targets were taught relationally where possible, following the Relational Frame Theory. The early developing relational frame of coordination was targeted within sessions, and included matching 3D objects to each other, matching 2D pictures to 3D objects, matching objects of similar colours and making paired associations with items (e.g. sorting animals into land based or ocean based). JC's comprehension was also targeted through the use of single-step instructions. Single step instructions progressed from demonstration of basic verbs (i.e. "jump", "wave", "stomp"), to pointing within single-step



instructions (i.e. “point to the horse”, “point to the circle”), the introduction of information carrying units (i.e. “show me the blue house”), and, finally, single-step instructions including travel (i.e. “touch the door”, “go to the fridge”) to also target working memory. As skills progressed, an increased number information carrying units were embedded into instructions, and instructions were extended to include multiple steps. Where possible, functional instructions were included as therapy targets to increase generalisation of skills into natural contexts. For example, “put your shoes away”, “put it in the bin” and “open the door” were requested as targets by JC’s family to improve his independence within activities of daily living. Quantitative data was recorded within therapy, with each trial yielding a correct, incorrect or prompted response, and 10 trials of each goal conducted per session.

### Outcome measures

JC’s comprehension of single words has developed to 80% accuracy with symbolic representations of common vocabulary targets when presented within a field of view of three. JC is able to follow a broader range of single-step instructions, including “put on your shoes”, “open the door”, “feed the dog”, “put this away”, “sit down”, “stand up” and “come here” at 80% accuracy with no support. JC progressed from matching 3D objects to making paired associations with objects at 100% accuracy with no support.

## Expressive language/phonology

### Theoretical rationale

One common treatment approach when working with individuals with phonological disorders including Childhood Apraxia of Speech is the Nuffield Dyspraxia Program [Williams, Stephens, 2004; Williams, McCleod, McCauley, 2010]. When working with individuals with severe phonological errors, the Nuffield Dyspraxia Program recommends utilising a “bottom-up approach” where single sounds are targeted first, beginning with early developing consonants, vowels and CV words before progressing to later developing sounds and multisyllabic words. The principles of motor learning including massed practice, distributed practice and explicit feedback may also be embedded within therapy to improve treatment outcomes [Murray, McCabe, Mallard, 2015].

### Initial measures

Early assessment of JC’s phonological production using the Fisher Atkin Articulation Survey indicated that he presented with a significantly reduced and he was stimulable for the following consonants in isolation: /m/, /n/, /d/, /b/, /f/, /s/, /sh/ and /w/. His



speech was characterised by a range of delayed phonological error processes including stopping, fronting, cluster reduction, reduplication and weak syllable deletion. These errors were highly inconsistent, indicating the possible presence of a motor planning deficit, such as Childhood Apraxia of Speech (CAS).

### Treatment approaches

Initial targets included the imitation of single sounds to improve consistency of production (initial speech sound targets were /m/, /p/, /t/, /n/ and /b/), followed by single-syllable, consonant-vowel structured words. Visual cues and biofeedback were used to elicit each phoneme and encourage clear production of speech. In addition to early sound targets, simple functional words were included as targets within speech sound practice, and included “go”, “help”, “more”, “no” and “bye”. These were included as both massed practice targets and within natural contexts (i.e. requesting more of a desired item) to encourage functional use of language and the generalisation of skills. Again, progress was recorded quantitatively, with each attempt to produce individual phonemes and words being recorded as correct, incorrect or prompted within sessions.

### Outcome measures

JC has made slow but consistent gains within this domain, and is able to produce the majority of age-appropriate consonants in isolation and in single-syllable CV words at 100% accuracy. Current therapy targets are for JC to produce these consonants in VC structured words, which he is currently able to do at 40% accuracy. JC consistently produces functional core language targets in appropriate contexts including “more”, “go”, “no”, “mummy”, “daddy”, “buddy” and “help” with gestural prompting.

## Joint and shared attention

### Theoretical rationale

Joint and shared attention is a common core underlying deficit within children with ASD, and is theoretically proposed as a prerequisite for the acquisition of language [Bono, Daley, Sigman, 2004]. Some research suggests that joint attention skills are also related to the development of Theory of Mind [Camaioni et al., 2004; Cochet et al., 2017]. It is important that clinicians distinguish between the differing joint attention functions when measuring progress within therapy. Imperative triadic exchanges are function to request objects, whilst declarative triadic exchanges serve to share awareness of an event or object [Charman, 2003]. Both of these acts are impaired in individuals with ASD, however impairments to the development of declarative exchanges are more severe.

## Initial measures

At the time of assessment, JC had already developed some early joint attention skills, and was able to follow a finger point to identify an object from a choice of two when it was in reach of him (within 30 cm). JC was able to attend to shared task for less than 5 seconds without engaging in RBRI.

## Treatment approaches

Initial therapy targets included improving JC's development of sustained attention within a shared activity (such as whilst sharing a book with an adult) and his ability to follow a finger point or eye-gaze across the room to gain access to a desired object. To target JC's ability to follow others' declarative triadic exchanges, the SLP hid desired items or tokens around the room, and then pointed or looked towards where the items were hidden. As JC's accuracy improved, targets were moved further away, and finger-points and eye gazes were made more subtle. As JC's receptive joint attention skills developed, the SLP attempted to elicit the initiation of joint attention skills by placing desired items within sight but out of reach (to elicit an imperative triadic exchange). For these trials, the goal was for JC to initiate a co-ordinated finger point or eye gaze between himself and the SLP, or between himself and his caregivers. Trials were recorded as not initiated by JC, prompted or initiated independently for each trial. To improve his sustained attention within shared activities, timers were used and increased by intervals of 5 seconds within tasks, with him receiving a token for attending to the task for the allotted amount of time.

## Outcome measures

Data from recent therapy sessions indicates that JC consistently follows others' eye gaze to collect objects up to 2 meters away. He is able to initiate a coordinated triadic imperative exchange (using a finger point) to request items that are out of his reach at 70% accuracy without any prompting from others. JC is able to attend within a shared activity with caregivers and clinicians for up to 30 seconds without engaging in RBRI.

## AAC use

Early assessments of JC's speech and language skills indicated that he had a very limited vocabulary, a severe phonological delay that reduced his speech intelligibility, and highly echolalic speech. These language and speech difficulties resulted in poor autonomy and meant that he was unable to communicate the majority his needs, wants and feelings to others. These difficulties also led to high levels of frustration and the development of some oppositional and anti-social behaviours. AAC devices are well researched to have a high efficacy in supporting minimally verbal

individuals to communicate with others. Throughout therapy, a range of AAC devices have been trialled and implemented for use with JC. These include the Picture Exchange Communication System (PECS), communication boards and has recently involved a trial of high technology assistive technology systems with communication software (the Liberator Rugged 7 with TouchChat – WordPower 25). An application for the purchase of one such device is currently underway. AAC intervention included the use of core language targets within therapy to promote functional communication and the generalisation of core, rather than fringe, vocabulary [Snodgrass, Stoner, Angell, 2013].

## Conclusions and recommendations

Speech and language pathologists play a vital role in the assessment and intervention of individuals with ASD. There are a number of well-researched, efficacious intervention approaches and programs that may be utilised by SLPs when working with this cohort. The current study described the specific assessments and therapy approaches used by one SLP in treating a minimally verbal child with ASD. It aimed to describe the process of selecting therapy targets and intervention programs to support the individual needs of the client and his family, following a family-centred approach. This study revealed that the use of several treatment approaches is often required to meet the needs of each individual. The current single case-study presents a range of limitations, and the data of only one participant is not sufficient to draw conclusions regarding the effectiveness of therapy within a wider population.

Presently, research into the selection and combination of intervention approaches is greatly limited. The selection of an intervention program is often left for the SLP to decide, and currently no standardised screening tools or protocols exist to support clinicians in selecting the most appropriate intervention program for patients, within the context of family-centred practices. Further research regarding the standardised selection of speech and language pathology intervention programs, utilising family-centred practices, is required to ensure that clinicians are consistent in providing the highest quality of healthcare to individuals on the autism spectrum.

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## Abstract

Speech and language pathologists have an important role to play in the treatment of individuals with Autism Spectrum Disorder. There exists a large body of evidence regarding the efficacy of assessment protocols and treatment approaches for individuals with ASD. There is an ever-growing need for clinicians to adopt holistic, family-centred clinical practices, and this is particularly important within ASD, where clinical presentations are often varied. This study described the assessments and intervention programs used by one SLP in the treatment of a minimally verbal seven-year-old male with a diagnosis of autism spectrum disorder. It found that the utilisation of multiple treatment programs may be required within therapy to provide individuals on the autism spectrum with high-quality, family-centred intervention. Further research into the development of clinically standardized procedures for selecting speech pathology interventions to promote client-centred practices is recommended.

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## Streszczenie

Logopedzi odgrywają ważną rolę w leczeniu osób ze spektrum zaburzeń autystycznych. Istnieje wiele dowodów świadczących o skuteczności diagnozy i metod leczenia osób z ASD. Wciąż obserwuje się rosnącą potrzebę przyjęcia całościowych praktyk klinicznych, dostosowanych do indywidualnych potrzeb dziecka i jego rodziny, co jest szczególnie ważne w przypadku ASD, gdzie objawy kliniczne są często zróżnicowane. W artykule przedstawiono zagadnienie diagnozy i terapii stosowanej w leczeniu prawie niemówiącego 7-letniego chłopca z rozpoznaniem spektrum zaburzeń autystycznych. Zwrócono jednocześnie uwagę, że w ramach terapii konieczne może okazać się łączenie wielu metod leczenia, by zapewnić optymalną rehabilitację osobom z ASD. Zalecane są dalsze badania nad opracowaniem klinicznie ustandaryzowanych procedur wyboru metod terapii logopedycznej w celu promowania praktyk skoncentrowanych na chorym.